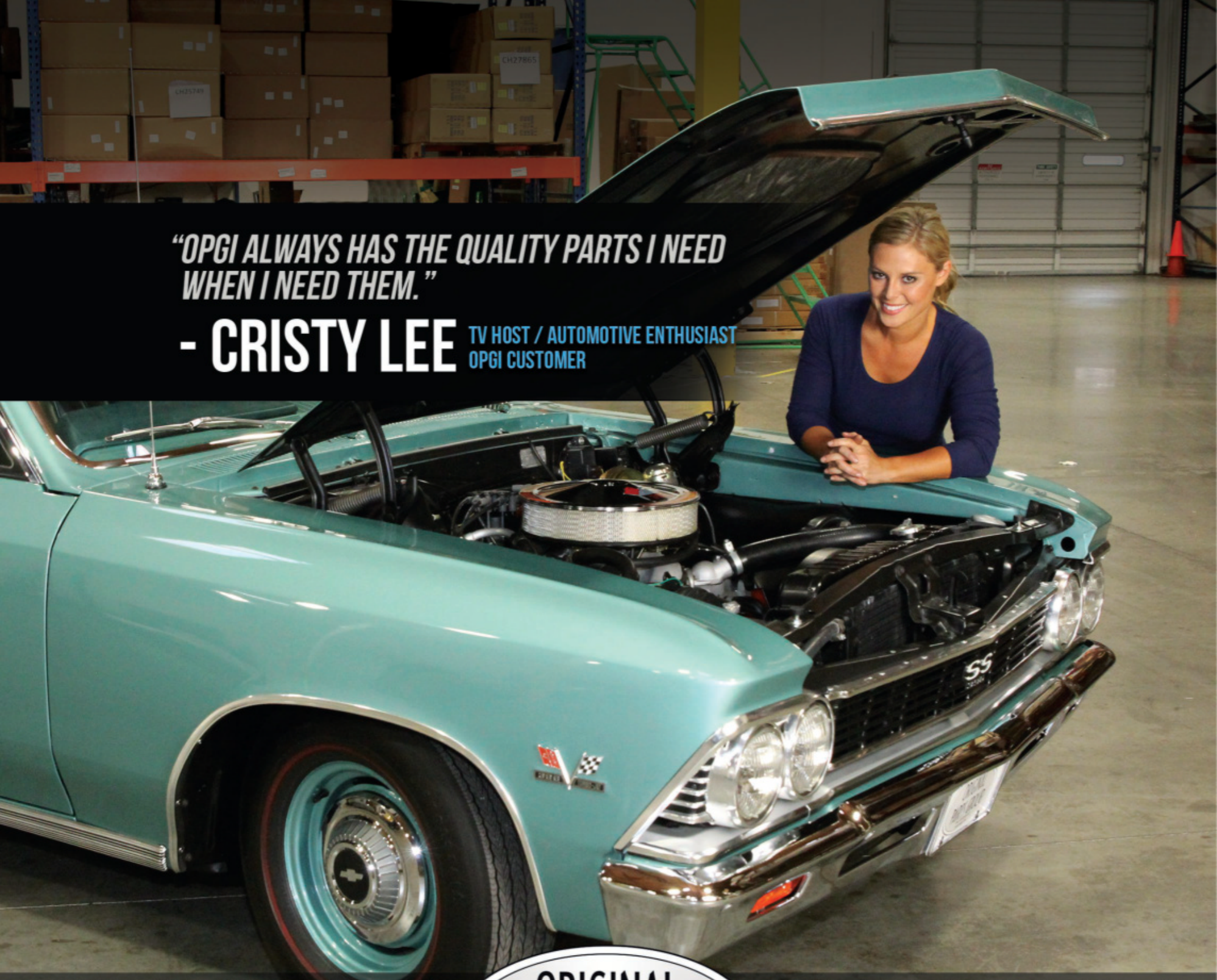

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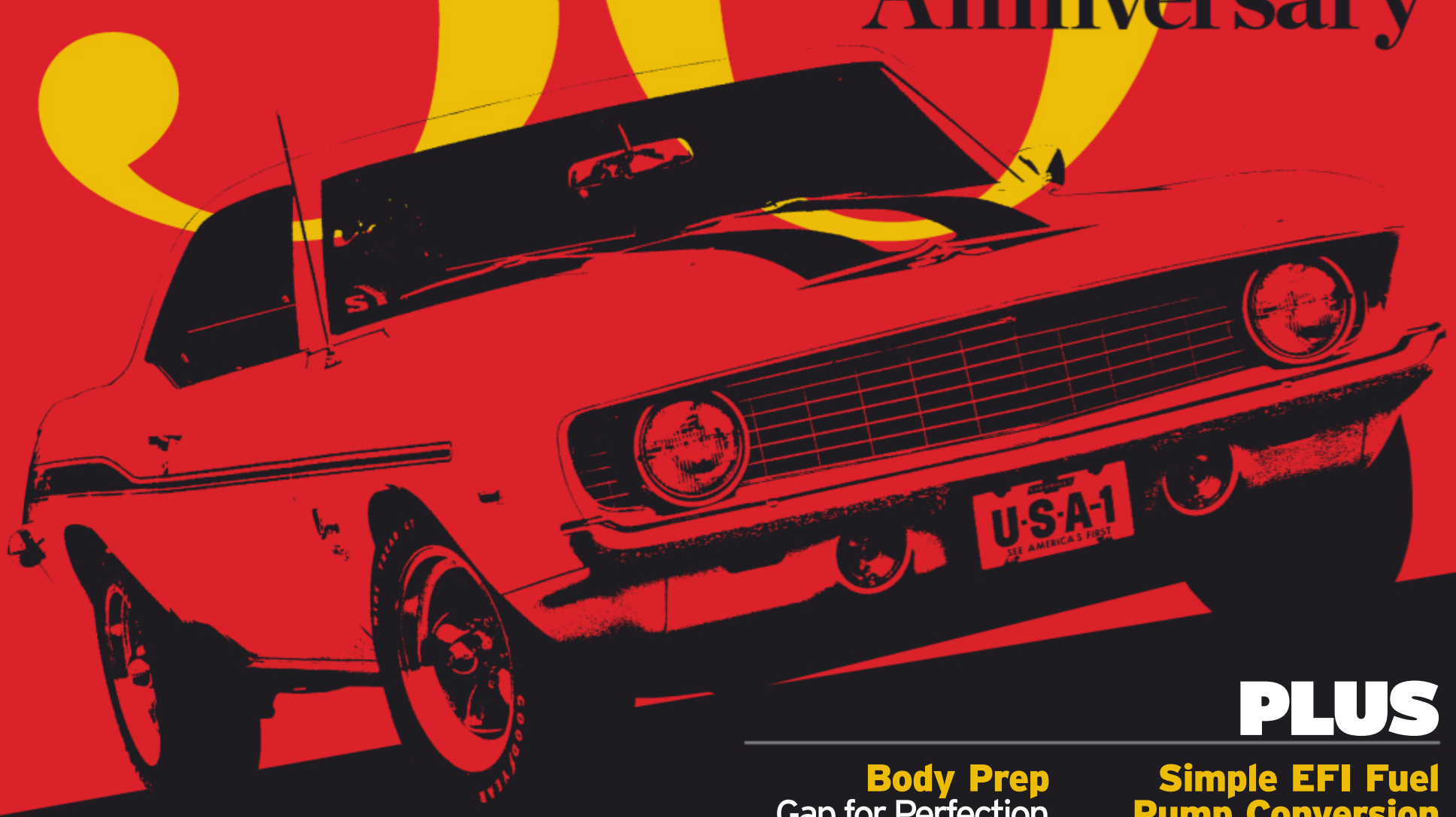

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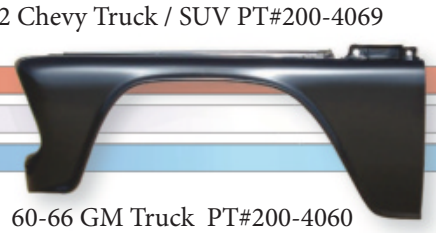

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★MAY 2019

TECH

DEPARTMENTS

★Digital Delivery

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•COVER

It's hard to believe, but the 1969 Camaro just turned 50 years old. And what's more amazing is that the car's youthful, sporty appearance continues to attract enthusiasts of all ages and demographics. Its attractive body lines encapsulate the car's limitless versatility so it looks just as good as a day two resto as it does a Pro Tourer, drag car, or even in showroom stock trim. We celebrate the 50th anniversary of America's all-time favorite classic muscle car on page 26.

•TOC

Being *Chevy High Performance* uses some of the most talented photographers in the automotive industry, our two-page TOC is a great place to showcase their talent by sharing an attractive, story-telling photo. This month we feature Chris Shelton's stellar image of Keith Byer's Pro Touring 1969 Camaro.

FIRING UP

Nick Licata NLicata@motortrend.com

Watts up with the 2019 eCopo Camaro concept

Benjamin "Bugsy" Siegel was not the first to build a casino in Las Vegas, but he played a major part in the construction of the first luxury hotel/casino—the Flamingo, which opened its doors to a less-than-stellar reception on December 26, 1946. Bleeding money from the beginning, the Flamingo closed its doors in January 1947 only to reopen in March 1947 and lucky for Bugsy, it actually began turning a profit soon after. Not lucky for Bugsy, he was shot dead approximately three months later on June 20th. The story is well documented in the 1991 movie *Bugsy*.

In 1977, SEMA (Specialty Equipment Market Association) moved its hugely successful aftermarket parts industry show from smaller venues in California to Las Vegas due to the demand for more space and to take advantage of its world-famous location—a move we can thank good old Bugsy for today.

As I headed blindly into the 2018 SEMA Show, my expectations of seeing plenty of new products was the first box I checked off. Second was seeing all the truly amazing car builds from just about every "sheetmetal master" from across the country. And as I made my way to the Chevrolet display I couldn't help but notice two 2019 COPO Camaros on the carpet. Generally not a big deal, as they've been bringing out the latest drag-only Camaro since its re-introduction back at the 2011 SEMA Show, but showing off one COPO typically gets the job done. So why two this year?

As I hovered over the engine compartment of the first COPO I instantly noticed the lack of a blower, big-ass Holley intake, fuel injection, or anything else that resembled a high-octane fuel burning engine. What I saw looked pretty cool, but it was something I'd never seen before: Two BorgWarner motors hooked up to a conventional TH400 transmission. It also featured four 200-volt battery packs strategically placed in the rear seat and trunk for proper weight distribution. That's 800 volts of power in which I have no idea what that translates to, but it sounds like a lot.

What I learned is that the eCOPO concept, with its Electric Dual Motor Stack, puts out 750 hp and 600 lb-ft of torque at 9,000 rpm and is capable of running quarter-mile times in the 9-second range. As of this writing, the car is still in the testing phase and has yet to run that number, but the gurus behind the build are close to making that a reality.

So does the eCOPO mark the end of noisy, sweet-smelling, fuel-burning V-8 engines roaring down the dragstrip? Not hardly. Most of drag racing's fan appeal is experiencing the smell and feeling the noise of the gnarliest engines on the planet. To me, there's nothing in the world that sounds angrier than a Top Fuel engine running on 90 percent nitromethane, even at idle. And on a smaller scale, a badass Chevy rumbling through a kick-ass exhaust system sounds pretty damn cool, too.

I suppose the sound, or lack thereof, as two eCOPO Camaros launch off the line with wheels up will take quite a bit of getting used to, but if it means another competitive class in NHRA drag racing, then I'm all for it.

With the continuing advances in battery technology, could we see an experimental Electric Super Stock Camaro class going down the dragstrip sometime in 2019? I hope so, but the folks at Chevrolet Performance are very tight-lipped about the car's future at this point. With that said, I wouldn't be surprised if there is an NHRA electric car class with Chevy, Ford, and Dodge going at it by 2021.

Today's consumer electric cars are proven to be practical, powerful, and with the amount of available torque, they are actually fun to drive, and the fact that the Tesla Model S has "Ludicrous Mode" totally piques my interest.

But for now my roots are firmly planted in the old-school muscle car world, so I'm gonna hang back and enjoy the sound and feel of a pissed-off V-8 running through a set of wide-open headers.

You in?

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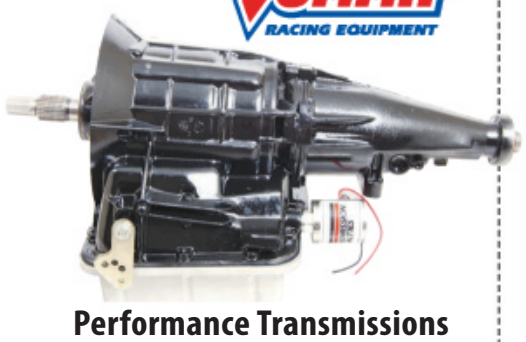

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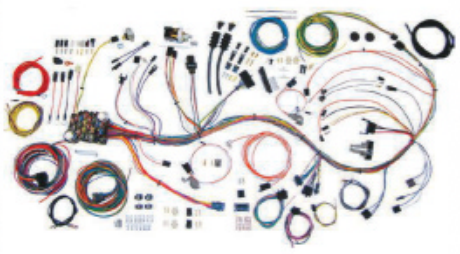

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STRAIGHT LINE SPOTLIGHT

TEXT **Bruce Biegler** • PHOTOS **Bruce Biegler** and **Steve Embling**

Continued Family Tradition

★NHRA's chase for Lucas Oil World Championship glory during 2018 included a very significant title for second-generation racer Brian McClanahan in Stock Eliminator. Racing his AA/SA 1969 Camaro, Brian clinched the prestigious World Championship during the NHRA Lucas Oil Pacific Division season finale held in Las Vegas. For Brian (Alta Loma, California), it was his first world title, but not the first for his family. McClanahan now joins his dad, Jerry, and his son Ryan on the NHRA World Champions ledger. Previously, Jerry won NHRA Stock Eliminator world titles three times (1973, 1974, and 1978), while Ryan prevailed to win the NHRA Super Stock title in 2010—all in Chevrolet cars. Sponsored by Total Trucking Service and Titan Tire Recycling (Fontana, California), Brian races a Hansen Race Cars-built Camaro that debuted for competition in 2010. The Camaro features an all-aluminum ZL1 427ci engine by Daryl Wykle Racing Engines and a Turbo 350 transmission by ProTrans.

Short Track Specialists

★A Can-Am racing team produced an impressive championship in the eighth-mile PDRA (Professional Drag Racers Association) series. Car owner and superb tuner Al Billes and his skilled driver Tommy D'Aprile coalesced to win the series' Pro Boost title. Racing a Jerry Bickel-built 1969 Camaro that was converted from P/X (Pro Extreme), the dynamic duo won three times on the PDRA season tour. A strong event finish at the season-ending World Finals in Virginia affirmed their top spot in the final standings. This particular race car features a creative aftermarket engine program. Known as a "4.9," it is a supercharged, alcohol-burning application that traces its origin and design to Australian-based Noonan Race Engineering. Throughout the season the car was dominant from a performance perspective, too, with D'Aprile qualifying Number One at all but one of the PDRA races they attended in 2018. The race car, which features a roots-style blower and a Turbo 400 transmission, was credited with a super-quick 3.62 elapsed time.

Chicagoland Sleeper

★The husband and wife team of Keith and Libby Brockman race a pretty inconspicuous looking race car with which they have surprised their competition more than once. Together, the Brockmans run a nicely prepped 1972 Chevelle Concours wagon—a car seldom seen on the dragstrip. This car first hit the strip back in 2001 as a 13-second runner after being found on Chicago's north side with only 56,000 original miles on it. Since then it has evolved and been updated. The current driveline configuration includes a Chevrolet Performance ZZ502 crate engine and a Jim Buford-built TH400 automatic transmission. Power is delivered to a 12-bolt rearend that houses 3.73 gears. The deceiving-looking wagon, which showcases some of its original Cranberry Red paint, is pretty darn quick given its overall weight (4,360 pounds), with a best time of 11.72 at 112 mph. Keith and Libby are regulars at their hometown track, Route 66 Raceway in Joliet, Illinois, while campaigning it both in ET brackets and NMCA's Open Comp class.

8-Seconds Later

★We really like the looks and detail of this highly competitive 1966 Chevy II raced by Wisconsin's Louie Raffetto. After about a two-year construction period from concept to reality, Louie first entered his race car into competition back in 2014. It features a 427ci big-block assembled by Wagner Motorsports (Markesan, Wisconsin) that sports a Dart block and 18-degree Brodix cylinder heads, and produces over 800 hp and almost 700 lb-ft of torque. Louie applies that power to an ATI torque converter and transmission, and a rearend housing and four-link assembly from RJ Race Cars. Raffetto's Chevy is one of the most popular entries within the NMCA racing circuit. He also runs the car in NHRA Pro and Super Pro ET bracket classes. Louie is a fabricator by trade and owns Lou's Hot Rod Shop in Boyd, Wisconsin, so this car features his own expertise with the chassis, paint, and electrical, all done in-house. His family oriented team includes wife, Bobbi Jo; daughter Allison; and son Dominic. When conditions warrant, this slick-looking Chevy II can run in the high 8-second zone at close to 150 mph.

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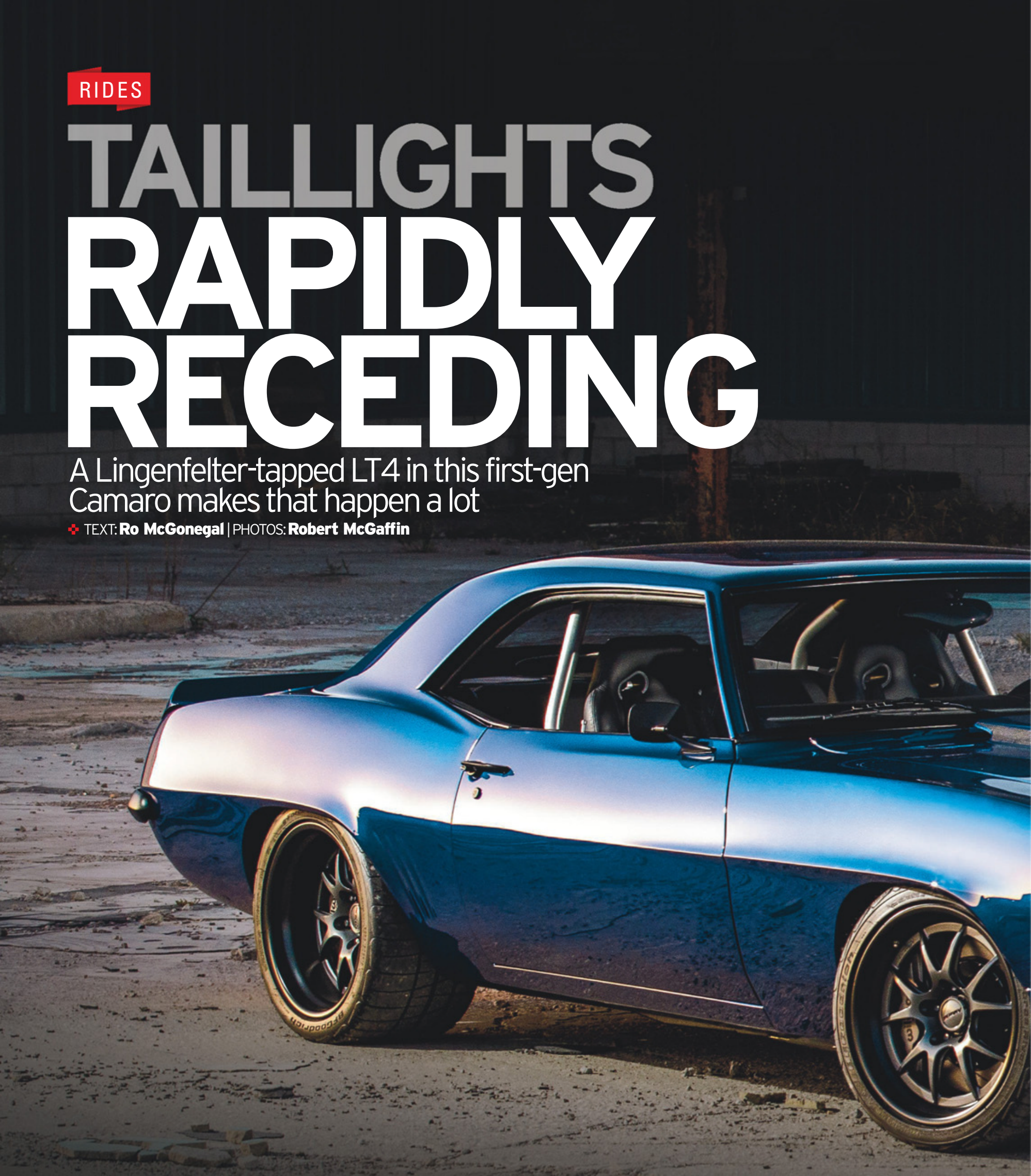
RIDES

TAILLIGHTS RAPIDLY RECEDING

A Lingenfelter-tapped LT4 in this first-gen Camaro makes that happen a lot

TEXT: **Ro McGonegal** | PHOTOS: **Robert McGaffin**



The story is as old as hot rodding. Call it hot rodding lore—you know it, eyes bigger than stomach bite off more than they can chew. But this isn't about trying to wolf a four-and-half-pound beefsteak at the Big Texan while the clock is ticking. Inexperience is the reason; ego is the driver. But growing up, Alex Wright had been indoctrinated, had been around race cars and sports cars as a youngster.

"I bought the car when I was 22, and slowly started to strip it down. I had no idea how over my head I really was," Alex confessed. But luckily the bell rang before he tried anything. "When I found out that work would take me overseas, I stashed the car in

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my grandfather's barn." It would begin to take root. When he got back to the States six years later, he had kids and a busy career. What now, he gulped? "Fortunately," he said, "I found Smitty's Custom Automotive."

The Camaro was an orphan, a roller that had been restored but the sticky part was that the insides of it had suffered blazing heat. Chris Smith is an old hand at this business, he knows what real-time actually means, he knows the pitfalls, the BS, and, most importantly, how to craft a premium build. But before the Camaro got under Chris' roof, Alex had tried to insinuate himself. "It was bed-lined inside and out and I wanted to see what was underneath." He ground, chiseled, and scraped his heart and fingertips out on either side of the floorboards. He said

Taillights Rapidly Receding

he'd never been able to get that dirty before, but he'd actually put a part of himself in the build.

To gain formidable handling and cornering traits and to tailor the Camaro's stance, Smitty's gang got on it with Detroit Speed mechanicals. In front, the familiar hydroformed subframe attended by tall Detroit Speed spindles, control arms, and a splined antisway bar. Smitty's ensured wheel control with multi-adjustable RideTech coilover shocks. They added some resistance to torsional bending by running Detroit Speed connectors under the frameless chassis. At the business end, the patented QUADRALink assembly is damped by RideTech coilovers abetted by an antisway bar and a Panhard rod. Big brakes complement; Wilwood 14-inch plates all around

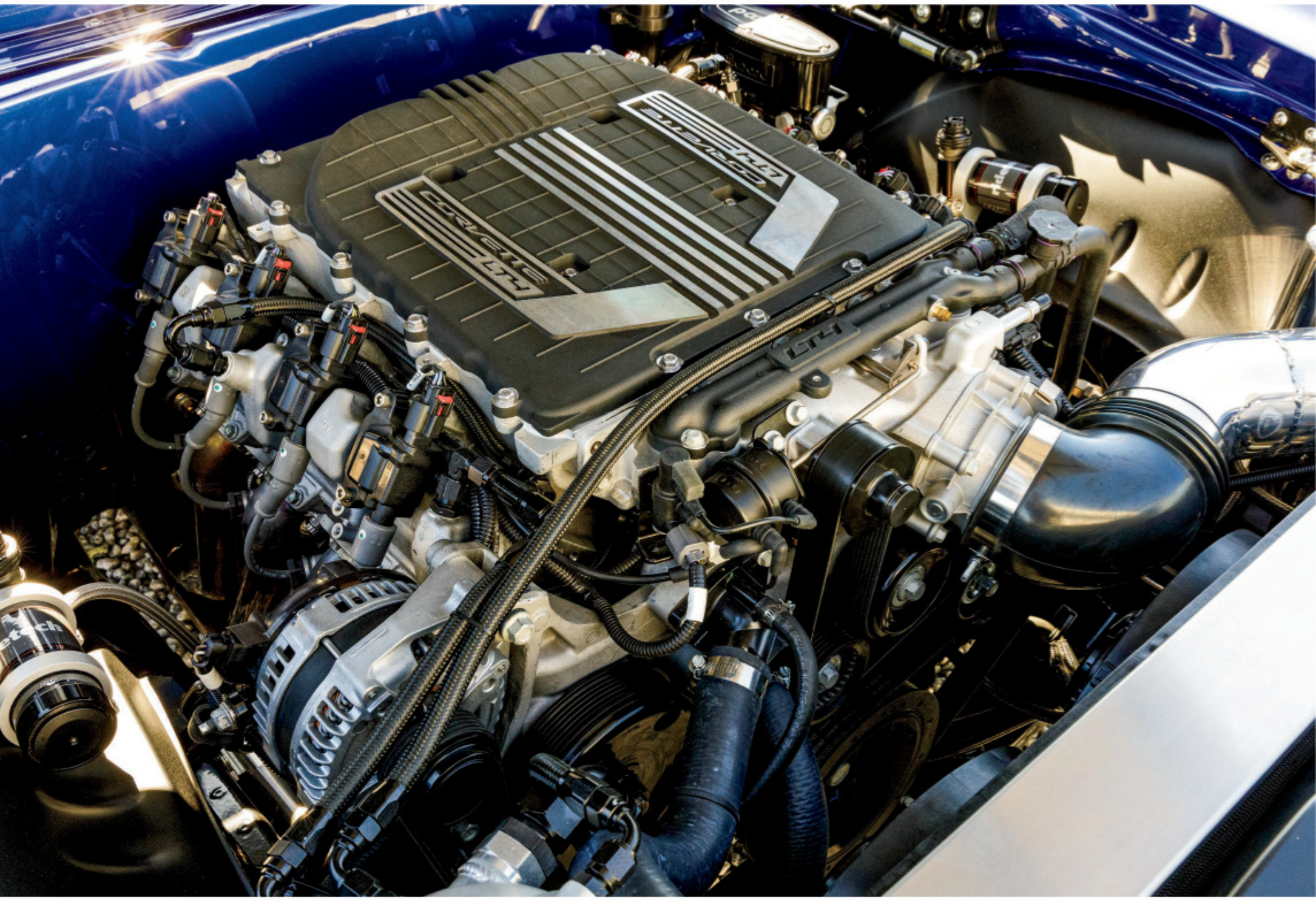
and six-piston calipers followed by four-piston pinchers.

You'd think that the LT4 engine would have dropped in the chassis more or less. Sure, it turned out to be more than less. Certain exhaust headers interfered with the Detroit Speed front-end components. Ultimate Headers snakes with 1 7/8-inch primaries brought the issue to a close. Also, there were minor clearance troubles with the OE pulley arrangement that were solved straightaway. Alex couldn't resist the hairy idea of dry-sump oiling, so Smitty's built him a reservoir and put it way forward on the passenger side of the engine compartment where the tank would normally be in a Z06 Corvette.

From there, the package went to Lingenfelter Engineering for the tuning and tweaking. The factory LT4 advertises 650 hp at 6,000 rpm and 650 lb-ft at 4,600 rpm at the crankshaft. Lingenfelter petted 638 hp and 632 lb-ft from that engine at the tire tread, so they did a real fine job there. Rather than putting a ho-hum slushbox behind it, Alex got feisty and stuck a Bowler-prepped T-56 and Centerforce clutch pack/flywheel (enabled by hydraulic linkage) behind the Super Magnum bellhousing. With an 0.63:1 top gear, Alex's final drive reduces the numerical cog in the 9-inch to lazy 2.23:1.

Well, yes, Smitty's is very good at mechanical chores because they must be, but that is another realm entirely from how they illustrate the car, especially with a dark, turbulent color. To clean up the landscape, they shaved the side markers, gave it OER bumpers, and put in Anzo LED headlamps and Billet Specialties taillights. The firewall got smoothed. They attacked the body

Taillights Rapidly Receding



seams and gapped them skinny and straight. Although the paint came from PPG, according to Chris Smith it's his custom mix blue that is seriously complemented by the matte black finish on those Forgeline alloys. Even the smoked window glass contributes.

Trent's Trick Upholstery over in Baltimore (Ohio) remedied the stripped, fire-blackened hovel that was once the Camaro's interior. They covered Cerullo seats with leather and then moved to the doors and quarter-panels with the same. They laid down Dynamat and covered it with custom carpet. Over the steel dashboard they placed a TMI cover, and then they pasted it with a Detroit Speed insert and filled the holes with AutoMeter meters. Wait long enough and the whole coalesces down at the handbuilt console.

Winter means crap weather almost everywhere in the country. Since it gets that way in Ohio, too, Alex doesn't hit the tarmac until the slab is warm and dry, and then he's out a few times a month stirring up some passion. Immediately after its 26-month gestation, he learned to trust the Camaro's efficiency. "I drove several hundred miles to upstate New York." Not a hiccup. Not a fart. Not a wheeze. That most of us have had hot rods quit running—sometimes in the dark, for no apparent explanation—this charming quality cannot be understated.

If nothing more, the Alex Camaro is a four-wheeled pal in the guise of a hairy, favorite four-legged companion—always faithful and always ready to go whenever you want to go. ***CHP***

TECH CHECK

Owner: Alex Wright, Mount Vernon, Ohio
Vehicle: 1969 Camaro

Engine

- **Type:** Chevrolet Performance LT4 crate engine
- **Displacement:** 376 ci
- **Compression Ratio:** 10.0:1
- **Bore:** 4.065 inches
- **Stroke:** 3.622 inches
- **Cylinder Heads:** A365 T6 Rotocast, 2.13 steel/1.59 titanium valves, 65cc combustion chambers
- **Rotating Assembly:** Forged steel crankshaft, powdered-metal steel connecting rods, forged pistons, OE dry-sump oiling system, custom tank
- **Valvetrain:** OE 1.8:1 ratio rocker arms, OE pushrods
- **Camshaft:** Hydraulic roller (0.492/0.551-inch lift; 189/223-deg. duration at 0.050)
- **Induction:** Eaton intake manifold, intercooled Eaton 1.7-liter R1740 TVS supercharger at 9 psi, Rick's Tanks stainless steel fuel cell
- **Ignition:** LT4 controller, OE coil packs
- **Exhaust:** Ultimate Headers 1 7/8-inch primaries, 3-inch stainless steel system, MagnaFlow mufflers
- **Ancillaries:** CNR aluminum radiator, American Autowire loom
- **Built By:** Chevrolet Performance
- **Machine Work:** Chevrolet Performance
- **Tuner:** Lingenfelter Engineering
- **Output (at the wheels):** 638 hp, 632 lb-ft

Drivetrain

- **Transmission:** TREMEC T-56 assembled by Bowler Transmissions, Centerforce clutch assembly and steel flywheel
- **Rear Axle:** Currie 9-inch assembly, Wavetrac differential, 3.55:1 gears, 33-spline axles

Chassis

- **Front Suspension:** Detroit Speed hydroformed subframe, Detroit Speed spindles, RideTech Track 1 triple-adjustable coilover shocks, Detroit Speed splined antisway bar
- **Rear Suspension:** Detroit Speed QUADRALink, antisway bar, Panhard bar, Track 1 triple-adjustable coilover shocks, Detroit Speed subframe connectors, Detroit Speed mini-tubs, RideTech TigerCage
- **Brakes:** Wilwood Aero 14-inch discs, six-piston calipers front; Wilwood 14-inch discs, four-piston calipers rear; Wilwood proportioning valve

Wheels & Tires

- **Wheels:** Forgeline GA3 18x10 front, 18x12 rear
- **Tires:** BFGoodrich Rival S 275/35 front, 335/30 rear

Interior

- **Upholstery:** Smitty's Custom Automotive (Tiffin, OH)
- **Material:** Leather
- **Seats:** Cerullo XR, RideTech five-point safety belts
- **Steering:** Flaming River column and steering box, MOMO wheel
- **Shifter:** Bowler
- **Dash:** TMI leather, Detroit Speed insert
- **Instrumentation:** AutoMeter Spek-Pro
- **Audio:** Kicker head unit, 6.5-inch front speakers, 6x9-inch rear speakers, 10-inch subwoofer, Kicker amps, installed by Smitty's Custom Automotive
- **HVAC:** Vintage Air

Exterior

- **Bodywork:** Smitty's Custom Automotive
- **Paint By:** Smitty's Custom Automotive
- **Paint:** PPG custom blue mix
- **Hood:** Carbon-fiber
- **Grille:** OER
- **Bumpers:** OER

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SPECIAL DELIVERY

New Sniper kit offers easy EFI fuel pump conversion for Chevelles and Camaros

TEXT & PHOTOS: **Jeff Smith**

One key to a successful electronic fuel injection conversion is, and always will be, to employ a high-quality fuel delivery system. If constant, pressurized fuel can't make it to the injectors the best EFI system in the world will perform poorly. This may sound simple enough, but the devil is—as they say—in the details, and the fine points will make or break a good installation.

It is in Holley's best interest as a fuel injection manufacturer to come up with a quality system that will work under grueling street conditions and high-g loads. They offer a few different universal fuel tank conversion kits and the HydraMat filter/pickup works very well. But the best situation is to create a fuel tank with a built-in fuel reservoir and then make those tanks for the popular performance cars like Camaros, Chevelles, Corvettes, Novas, and even trucks.

That's exactly what the Sniper fuel delivery system is all about. The kit comes with a Holley performance "pump-on-a-stick" system with a specific flange to mount the pump assembly inside a large reservoir located at the front of the tank. Alongside the pump assembly is a fuel level float assembly to drive the gas gauge.

Our plan was to upgrade our LS-powered Chevelle from a carburetor over to EFI using Holley's HP EFI ECU to transform this Chevelle over to 21st century fuel control. When Holley released the Sniper line with a dedicated fuel tank for this conversion, it became a moral imperative to make the conversion. Our old system used an externally mounted fuel pump and stock tank pickup with a return back

01 | A self-contained EFI fuel tank like this Sniper system makes for a clean installation and a far more efficient pump assembly.

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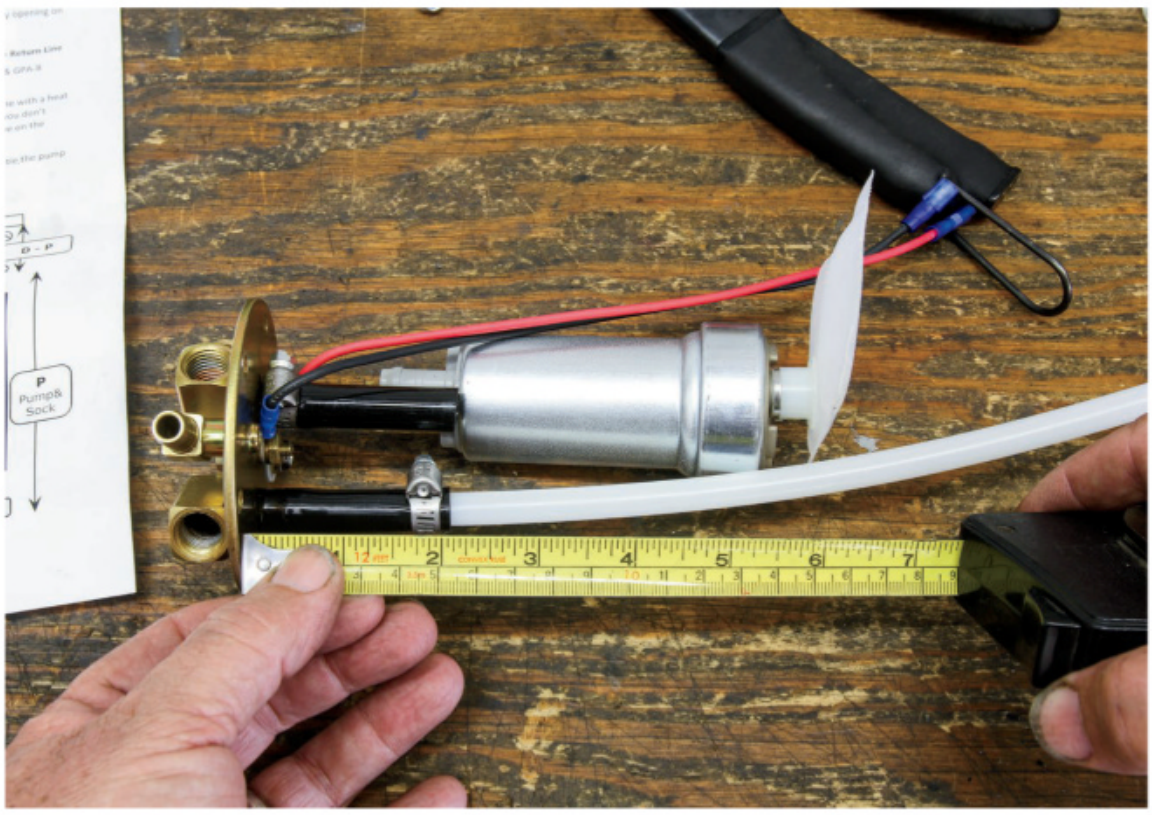
02 | This is the Sniper steel tank for our Chevelle upgrade. It really is as nice as the photo shows. Inside the tank is a reservoir designed to retain fuel around the fuel pump. This will work fine perhaps to under an eighth of a tank where there might be issues where the fuel could move away from the pickup. The Sniper tank was roughly one inch deeper than our stock tank to allow mounting the in-tank pump. The tank also comes with new straps to accommodate the 20-gallon capacity.

03 | This is the pump and float level assemblies that come with the tank. This kit uses the larger 400-lph pump that will feed upward of 750 EFI horsepower. Holley also offers a 450-lph pump that will accommodate E85.

04 | This is the optional 400-lph pump for this system. It's hard to image that a small pump like this can generate more than enough fuel and pressure to feed 750 hp.



05 | The pump bracket must be custom-fitted to each tank. This requires accurately measuring the depth of the system at the mounting location. Our depth was 6 5/8-inches and we set the pump depth to place the inlet just off the floor of the tank.

to the tank. It worked fine for our carbureted application, but it would have been inadequate for the constant EFI fuel pressure requirements.

Our new engine is an iron 6.0L LS with TFS heads that recently came off the dyno making 556 hp. The standard Sniper system uses a 255-lph (liter per hour) pump that is rated to deliver up to 550 hp worth of fuel at EFI pressures. Since one of the possible upgrades would be an NOS nitrous system controlled by the Holley HP, that entry-level pump capacity was going to be insufficient. Luckily, Holley offers an optional 400-lph pump intended just for gasoline that bumps the rated capacity to 750 naturally aspirated hp, which fits perfectly into our upgrade plans.

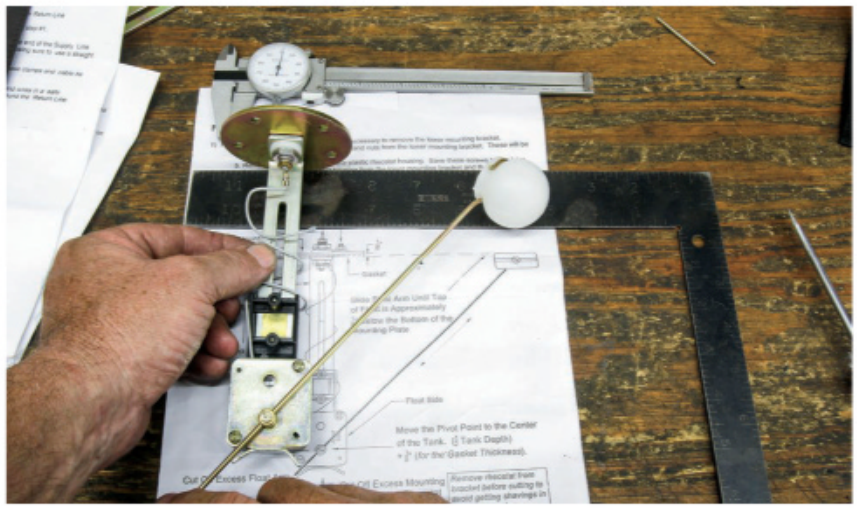
Perhaps the most important advantage to an in-tank pump is that the inlet to the pump is always submerged in fuel and does not have to "pull" fuel from the tank to the inlet as with an externally mounted pump. A standing column of fuel above an in-tank pump uses the weight of this fuel to push fuel into the inlet, improving pump efficiency. Plus, since the pump is submerged in fuel the pump will run much cooler, which improves durability.

Our current fuel delivery system was more than 10 years old and used older, rubber-lined braided steel hose. Because this car often sits for months at a time between test sessions, rubber fuel hose can quickly become brittle after alternating between wet and dry sessions. This drying cycle takes a toll on any rubber-lined fuel hose. We added a length of hard line, which helps, but the real solution was to replace the flexible hose lengths with a more durable material.

EFI Tank and Fuel System Applications

We've combined different year spans of cars to abbreviate this list as there are specific tanks for each body style application. But if you're driving a popular Chevy body style, it's likely Holley offers a tank for it.

1967-'81 Camaro
1964-'72 Chevelle
1962-'72 Nova
1956-'74 Corvette
1955-'57 Chevy
1961-'64 Impala
1978-'88 Malibu/Monte Carlo



06 | We installed and trimmed the float level assembly for the fuel level gauge and positioned it so the internal reservoir would not interfere with float operation. The float level lid installs in only one position, so we had to rotate the entire assembly to clear the reservoir.

07 | Here is the entire pump assembly about to go in the tank for the final time. We tightened the bolts in a star pattern to make sure the lid was evenly secured to the tank.

For years, the OEs have been using what is often referred to as plastic fuel line. The material is actually carbon-infused PTFE. This acronym stands for Poly-Tetra-Fluoro-Ethylene, which has also been known by the brand name Teflon. This material is extremely resistant to all types of fuel—even methanol and nitromethane—and if not abraded or exposed to open flame, offers an extremely long lifespan. Because of its strength and wall thickness, the material is somewhat stiff, necessitating a wide bend radius to prevent kinks.

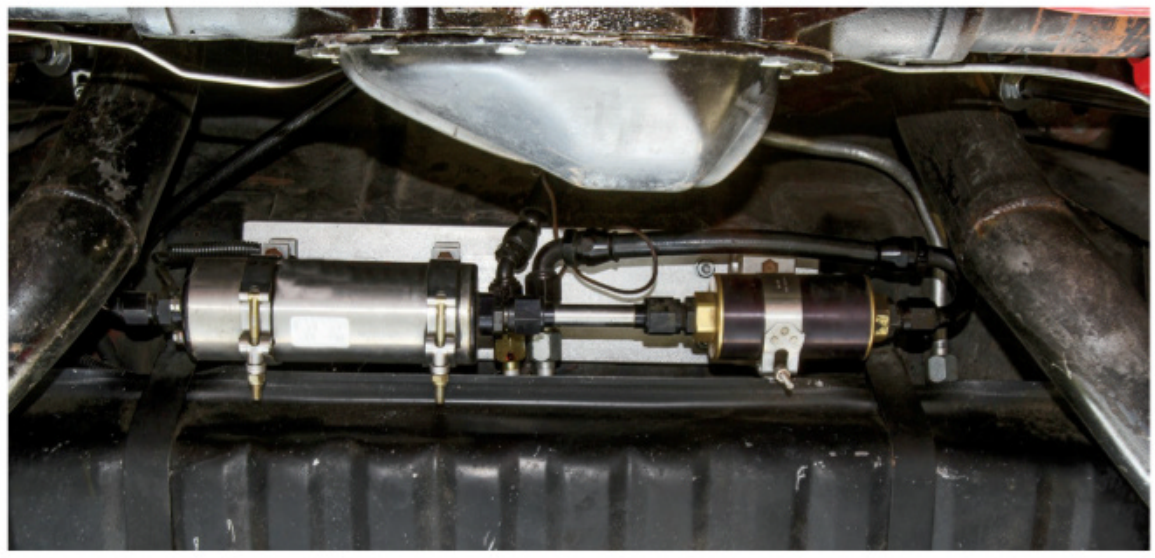
Holley's UltraPro hose uses a convoluted, or corrugated, wall construction that makes this hose both light and very easy to route with a very tight bend radius. When fuel is pushed through standard, white PTFE hose, the material is not a conductor so static electricity can build up on the line and cause pinhole leaks. UltraPro hose is carbon-infused (black), making it a safe conductor so there's no chance of a buildup of static electricity.

Make no mistake, the UltraPro hose and its specific fittings are expensive, but we're talking about a high-pressure fuel delivery system, which demands we make it as safe as possible. Investing in the Earl's hose and fittings is likely to make this the last fuel delivery system this car will need. Plus, it is completely compatible with different fuels, such as E85, should we decide to experiment with that fuel in this car.

With this relatively simple installation, we now have a very nice in-tank fuel delivery system capable of feeding 750 hp that looks nearly stock when mounted in the car, and will work flawlessly with our new EFI system. It's much cleaner than our previous effort, and that production-style fuel pump will last for years. Other than more horsepower, what more could you ask for? ***CHP***

08 | With both the float and pump assemblies in place, we used Earl's 1/4 NPT to -6 male AN adapter fittings to connect the pressure outlet and return lines. There's a vent tube in the tank as well as another in the pump assembly. The kit supplies a Y-fitting to connect both to an external vent using 5/16-inch hose.

09 | This is the anti-siphon rollover valve that we will connect to the vent and locate externally above the tank. An internal check ball prevents fuel from leaking out the vent should the vehicle roll over.



10 | This was our original fuel system using an external pump and pre-filter assembly mounted on an aluminum bracket just ahead of the stock tank. Unfortunately, this positioned the system very close to the rear axle housing. All of this and the stock tank were removed.

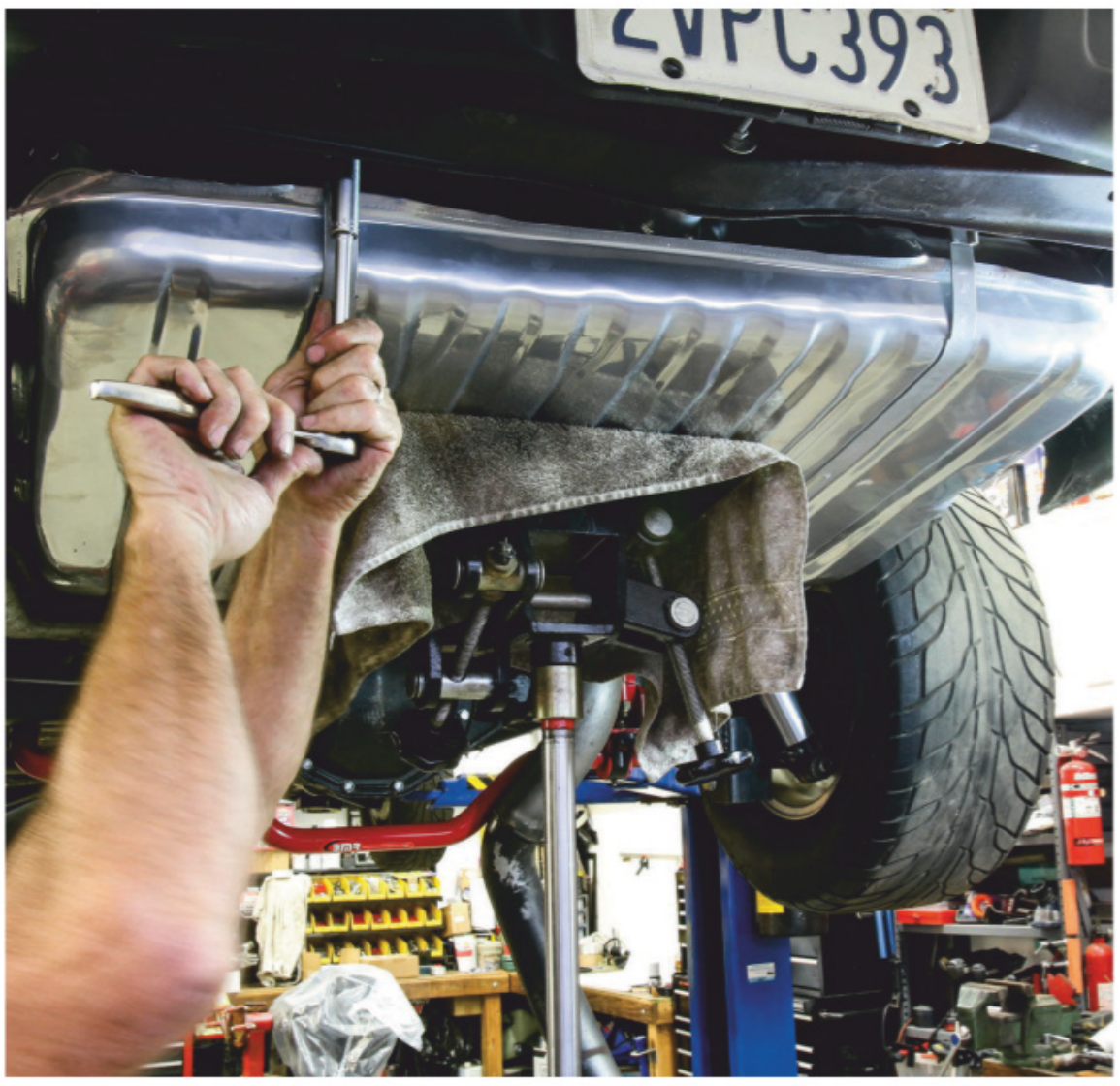
11 | We also converted to new Holley fuel lines that will allow us to use virtually any fuel—including E85. Earl's convoluted UltraPro PTFE -6 hose is the best choice for fuel compatibility and durability. The hose does require specific fittings.

Parts List		
Description	**PN**	**Source**
Sniper Fuel Delivery system, w/ 400-lph pump	SNE-19-405	Summit Racing
Sniper Fuel Delivery system, w/ 255-lph pump	SNE-19-105	Summit Racing
Earl's -6 AN male to -8 AN male reducer (2)	AT991912ERL	Summit Racing
Earl's UltraPro PTFE -6 hose, 20-ft	682006ERL	Summit Racing
Earl's 1/4-NPT to -6 AN black adapter fittings (2)	AT981606ERL	Summit Racing
Earl's -6 straight Speed-Seal hose end (6)	AT600136ERL	Summit Racing
Earl's -6, 90-degree Speed-Seal hose end	AT609236ERL	Summit Racing
Earl's -6, 45-degree Speed-Seal hose end	AT604736ERL	Summit Racing
Holley 10-micron fuel filter, 3/8-NPT female	HLY-162-550	Summit Racing

12 | To assemble the Earl's UltraPro hose, first pull back the outside cloth covering and slip the tapered end of the silver ferrule over the inner hose, extending a small portion of the hose past the end of the ferrule. Trim the inner tube flush with end of the ferrule with a razor blade and then screw the hose end together.

13 | Since the in-tank pump uses a pre-filter, the only other addition for this system was a Holley filter downstream to ensure all the impurities have been removed. This is a 100-micron stainless filter, but a 10-mircon is what you want for downstream filtering. The smaller the micron number, the finer the filtering potential. A 10-micron filter will capture anything larger than 0.0004-inch!

14 | Holley offers a universal pump conversion using the same fuel pump with a more substantial aluminum lid that will seal to the top of the tank. The only limitation would be the minimum tank depth required. In our case, our Chevelle tank wasn't deep enough to accommodate the Sniper in-tank conversion—necessitating the entire Sniper kit.



15 | Here's the final installation with the tank in place. This is a much cleaner installation compared to an external pump. In our car, this did require narrowing one section on each 3-inch tailpipe as the larger tank hit the pipes, but that was the only hiccup.

SPECIAL

50 YEARS OF THE 1969 CAMARO

Half a century of a design and performance icon

TEXT: **Barry Kluczyk** | PHOTOS: **the Author** AND **General Motors**

Collector Tim Schell has something like 40 cars in his expansive and impressive collection of muscle cars; and 19 of them are 1969 Camaros. Nineteen of them.

"The 1969 Camaro was always *the* car," he says. "There were a couple that cruised our town, including a black one with Center Line wheels. It just had the look. It was the one I, and everyone else, wanted."

Schell would be in his early 30s before time and finances allowed the purchase of his first '69 Camaro; and his collection has mushroomed considerably in the years since, including a number of cars that have come and gone.

"I got one as soon as I could afford it," says Schell. "It's not going anywhere, either."

For the record, Schell's 19 '69 Camaros include nine original COPO models—one of them an authentic aluminum ZL1—a Baldwin-Motion car, and even the 1969 Indy 500 Pace Car. Note that we said *the*, not *a*. He owns the original, track-used pace car #1.

We know what you're thinking: "Wow!"

Exactly.

Schell's collection is unquestionably enviable, but it embodies the passion most enthusiasts feel for the 1969 Camaro. He simply has the resources to express it better than most of us.

It's also a testament to the enduring popularity of the car 50 years after it

◆The freshly styled 1969 Camaro offered a more detailed, expressive design that was an immediate hit with customers. Just look at the smile on the child's face in this factory photo, as she hits the street with her mom in a big-block–powered SS 396. You can't help but wonder how good mom was at speed shifting with a trunk full of groceries.

◆The '69 Camaro's deep dual-plane grille added depth to the car's design and made the headlamps appear larger. It was a brighter, more optimistic look for the car that even looked "happy." A gray grille color was standard. SS models received a black grille. This example wears the VE3-code body-color bumper. Only about five percent of production models that year were ordered with that option.

◆Choice was one of the Camaro's selling points. In 1969, there were 14 available engines (including the two COPO 427s), 18 exterior colors, 5 vinyl roof colors, and 3 convertible top colors. There were also 15 interior trim colors, including four variations of the distinctive houndstooth pattern. Decisions, decisions.

rolled out of Chevy showrooms and into the hearts of enthusiasts.

INSTANT CLASSIC

It's true the original Mustang exploded like a Baby Boomer bomb on the marketplace, but its history-making popularity was due largely to its singularity. There just wasn't anything else like it. Other automakers scrambled to push out their own so-called ponycars and, of course, the 1967 Camaro was Chevrolet's response. It did very well from the start, too, selling more than 220,000 units in its inaugural year and a few more than that in 1968.

But it was the introduction of the face-lifted '69 model that changed everything for the Camaro. Although still riding on the same Chevy II-derived architecture as the '67 and '68 models, it had a more expressive, optimistic appearance that triggered an emotional response, like the shape of a Coke bottle, a Swiss Army knife or, a few decades later, an iPhone.

Upon the introduction of the Gen 6 Camaro, and shortly before his retirement, former General Motors design chief Ed Welburn—whose personal '69 Camaro was said to be used as in-studio inspiration and

◆The Rally Sport package returned for 1969. That included the signature, vacuum-operated hideaway headlamps, but with new windows that allowed illumination in case the doors failed, relieving the driver of the chore of manually opening them in the dark. Although immediately identified with the '69 Camaro, the option was comparatively rare. A little more than 37,000 cars were outfitted with the package, or just more than 15 percent of the total production.

◆Side-by-side profiles here show the standard SS hood, with simulated hood vents, and the available cowl-induction hood, which was also available on the Z/28.

◆It's known universally as the cowl-induction scoop, but Chevrolet called it the Super Scoop upon its debut on the 1969 Camaro. It was offered as a $79 option (RPO ZL2) on Super Sport and Z/28 models. And while it seems today they were installed on 105 percent of the production run, only about 10,000 were officially ordered. That's only 4 percent of all the '69 Camaros built.

◆At the rear, RS taillights were distinguished from other models with all-red lenses and separate backup lights installed below the bumpers. Non-RS cars had the backup lights incorporated in the center of the three-section lenses.

50 Years of the 1969 Camaro

◆In 1969, for the second time in three years, the Camaro was selected as the Indy 500 pace car. Chevrolet built 3,675 replicas that became instant collectibles. The actual pace car and its backup clone were 396-powered. Most were 350-powered, with a comparative handful equipped with a 396.

◆This seldom-seem vintage 1969 Camaro ad shows an RS-equipped SS convertible with wheel covers, the standard hood, and the body-color front bumper. The trunk-mounted luggage rack was a dealer-available accessory. The other focal point of the ad was French Alpine skier Jean-Claude Killy, who won three gold medals the previous year at the winter games in Grenoble. This ad was a promotion for a CBS show featuring him. The hockey stick stripe just makes the car, does it not?

◆The story of the special-order 1969 COPO Camaros is one that entails more than can be crammed into a photo caption, but here are the basics: COPO 9560 was the all-aluminum ZL1 and only 69 were built; COPO 9561 featured the iron-block L72 engine and it's estimated a little less than 1,000 were likely built.

◆Here's the solid-lifter L72 engine that was the focal point of the COPO 9561 package, which was initiated by dealer Don Yenko for his special models. Other dealers ordered their own; and at less than $500, it was a much cheaper alternative to the much more costlier ZL1.

reference for the Gen 5 Camaro's design—reflected on the importance of the first-generation Camaro's design, singling out the '69 model.

"[It] is the iconic Camaro to me," he said. "From the dual-plane grille design and speed lines stamped into the fenders and doors, it was original and distinctive. It didn't borrow from any other design and all these years, it still looks fresh."

He went on to call out the subtle yet effective elements that set the '69 Camaro apart from the two previous model years, including the rear fenders that were pulled out to enhance the car's muscular stance and the simulated vents ahead of the rear fenders that established a focal styling cue that became its signature accent.

Objectively, you can suggest that the '69 Camaro is the sum of its styling elements, but design is a subjective concern and, as it is said, beauty is in the eye of the beholder. It's more than X plus Y equaling Z. It just *is*.

In that regard, the '69 Camaro is the Ingrid Bergman of automotive design.

"It's one of the cars that crosses all the lines for enthusiasts, no matter where their brand loyalties lie," says Tim Schell. "You can be a dyed-in-the-wool Mopar guy and you'll still admire the 1969 Camaro. It's just beautiful."

Whether consciously or unconsciously, that's exactly what customers thought 50 years ago. And let's be honest, we're not just talking the supercar jockeys seeking more cubic inches. The vast majority of sales went to "everyday" models with six-cylinders or 307 small-block engines.

Chevrolet dealers collectively sold an additional 1,750 Camaros every month in 1969 compared to the '67, and the car's popularity slowed the Mustang's gallop to more of a trot. In

◆The track-used ’69 pace car and its backup featured specially built 396 engines. They started as L89 aluminum-head engines, but iron heads were swapped on them to ensure durability on the track. The engines were also blueprinted and more, and backed by Turbo 400 transmissions and 3.31 rear axles.

◆Only 69 ZL1 models were built in 1969, from an order initiated by dealer Fred Gibb. He had to order 50 of them, but because of the high price, most were returned and redistributed to other dealers. Other dealers caught wind of the plan and ordered their own, pushing the final tally to 69. This yellow example is the third car built and was sold by Michigan’s Berger Chevrolet.

◆This is one of two Canadian-sold COPO Camaros in collector Tim Schell’s roster of 19 ’69 Camaros. It is restored to a “Day Two” look, complete with Cragar S/S wheels and yellow traction bars. It is believed that about 80 of the 9561 L72 cars went to Canada.

◆Schell’s ultra-rare COPO was ordered from the factory with the V75-code “liquid tire chain” traction aid. Chevy records show only 188 out the 243,000-plus ’69 Camaros built had the “instant burnout” option—at least one of them on a COPO Camaro.

◆Not all ’69 Camaro performance models were built strictly for the strip. The Z/28 blended strong horsepower and agile handling to make it a performer on the road course. It was powered by a 302ci small-block rated at 290 horsepower. Production was strong, at more than 20,000, compared to the 602 and 7,199 built in 1967 and 1968, respectively.

1967, Mustang sales led the Camaro by something like 200 percent. Two years later, the lead was reduced to a little more than 20 percent.

PERFORMANCE INFLUENCER

More honesty, here: As beautiful as the ’69 Camaro is, we likely wouldn’t be devoting all this space to it if it weren’t for its correlative performance influence. A Chevette might have been the Mona Lisa of design—keep in mind we said *might*—but there was never a cowl-induction hood, rally stripes, or 396 big-block offered with it.

That’s the duality of the ’69 Camaro: It performed as well as it looked. We’re not going to delve into every engine option here, but from the high-winding 302 of the Z/28 to the 427 engines of the special-order COPO models, the car had the horsepower bingo card covered.

More than that, its chassis and overall dimensions, like its design, were spot-on.

“It’s just the right size,” says Pro Touring pioneer Mark Stielow, who’s built 10 ’69 Camaros over the years. “A Chevelle is too big and a Nova is too small. The first-gen Camaro has the right wheelbase and overall package. Nothing else looks like it. That single-year body style is a standout that will never go out of style.”

50 Years of the 1969 Camaro

◆Like the street machine trend a couple of decades earlier, the 1969 Camaro was the archetype for today's Pro Touring movement, led by the cars built by Mark Stielow. This is his Red Devil car, built in 2010 and featuring an LS7-based engine with an LS9 supercharger.

◆Yes, Virginia, there was a hemi small-block. Sort of. In an effort to further improve the 302 engine for Trans-Am series competition, Chevy experimented with an all-aluminum small-block that featured canted-valve cylinder heads, making it more of a semi-hemi, intended to be sold over the counter for '69 Camaro racers. The uber-expensive engine was never built in quantity, but a handful still exist, including at least one in this '69 Z/28.

◆The '69 Camaro all but defined the street machine and Pro Street movements of the '70s and '80s, as this 1978 cover of *Hot Rod* depicted—complete with the requisite GMC-style blower installation.

◆The Gen 5 Camaro was unabashedly retro in its design, with cues unmistakably inspired by the 1969 Camaro, from the grille to the simulated rear quarter-panel vents and even an obvious homage to the cowl-induction hood.

Of course, the '69 Camaro's performance legacy was forged before it even went into production. In the Trans-Am series, the Z/28 quickly established itself as a force to be reckoned with in 1967 and '68, but it all came together in 1969 with the dominating driving of Mark Donohue and his iconic blue Penske Camaro. He won half of the series' races that year, including six of the last seven—and the only race he didn't win in those seven races went to Ronnie Bucknum in another Camaro.

Likewise on the dragstrip. Racers such as Bill "Grumpy" Jenkins had already pushed the first-generation Camaro to the top of the Super Stock ranks and the '69 Camaro extended the momentum. In fact, Jenkins experimented with a ZL1-powered '69 Camaro in Super Stock the same year he was forging a path in the newly formed Pro Stock class.

Through the '70s and '80s, '69 Camaros were as ubiquitous as snorkel hoodscoops and Moroso tachometers in the Sportsman ranks at strips across North America. Everybody ran a '69 Camaro, because, as Mark Stielow put it earlier, it was the right-sized car. It worked and looked good doing it.

The '69 Camaro was even more of a fixture on the streets, supplanting the '55 Chevy as the go-to platform for hot rodders and the burgeoning street machine trend. From Van Nuys Boulevard in California, to Woodward Avenue in Detroit, and the countless haunts in New York, New Jersey, and other cruise spots around the country, there were so many Camaro street machines that it would have been be easy to assume 6-71 blowers and slapper bars were factory options. And by the end of the '80s, roughly three-quarters of the 243,000 '69 Camaros built had been tubbed.

At least, it seemed like it.

And as the performance trends evolved, the '69 Camaro remained a constant fixture, with builders such as Stielow leading the way, supported in the aftermarket by companies such as Detroit Speed Inc., Holley, and plenty of others, all crafting components to adapt the latest powertrains and chassis components to contemporize the driving experience of a timeless design.

Fifty years from now, when our robot drivers are ferrying us around in electrified hover cars, you can bet the 2069 SEMA Show will have Holley's Flux Capacitor retrofit showcased in a '69 Camaro.

It will still be *the* car. ***CHP***

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FIVE THAT MATTERED

Countless 1969 Camaros have been built for the street, strip, and more over the past 50 years. And while it would seem impossible to narrow them all down to the most important and influential, we've nonetheless taken a run at it. Here, then, is *CHP's* list of the five most significant 1969 Camaros in the history of high performance.

1. THE FRED GIBB-DICK HARRELL ZL1

It was the first production Camaro ZL1 built and one of the 50 ordered by dealer Fred Gibb. He immediately sent it to Dick Harrell's shop in Kansas City, Missouri, to prep it for Super Stock competition. Driven by Herb Fox, who bested Ronnie Sox's Hemi Barracuda in eliminations during the car's first outing, this was the car that established the ZL1 legacy.

2. LES SUTAK'S '69 Z/28 STREET MACHINE

Blown first-gen Camaros all but established the street machine movement, but Sutak's car, immortalized on the cover of *Hot Rod's* November 1979 issue, epitomized the popular trend that still has roots. It had the right stance, with the big-and-little Cragar S/S wheels and traction bars, but it was the 6-71 "huffer" pushing through the hood that helped it define the era and trend. Better still, Sutak still owns it and it still looks the same as it did 40 years ago.

3. DAN AND R.J. GOTTLIEB'S BIG RED

In the mid-'80s, when everyone else was tubbing their Camaros, the Gottliebs teamed up with Bill Osborne to build road-going '69 Camaro like no other. Originally conceived for Mexico's La Carrera Classica rally, the car was Pro Touring before Pro Touring existed. More than 30 years later, it remains one of the most recognizable Camaros out there and a fixture at speed-trial events, with a top speed to date of 266.2 mph.

4. RICK DYER'S C.A.R.S. '69 CAMARO

The yellow C.A.R.S.-backed Camaro campaigned by Rick Dyer was a trendsetter. Running a nitrous-fed 540 big-block, it ran 8s and made its mark in the very first *Hot Rod* Top 10 Fastest Street Car Shootout in 1992, which was a precursor to today's Drag Week. With its full interior and real glass all around, it helped launch (no pun intended) the new wave of ultra-powerful street/strip cars that continues to evolve today. The last we knew, it was owned by Jeff Atkinson, who continues to run it.

5. MARK STIELOW'S JACKASS

Mark Stielow's influential Camaro builds date back to the early '90s and drove today's popular Pro Touring movement. He's built about 10 '69 Camaros, but the 2009 debut of the yellow Jackass car stands out for its incorporation not only of the latest suspension technology, but also an LS9-supercharged engine. He's freshened the car since the original build, too, with more power and a new Detroit Speed front subframe. It's currently owned by Jason Ayres, but it's a Stielow car through and through.

ELEVATE YOUR CRATE!

Get racing power from a street crate engine with a top-end kit

TEXT & PHOTOS: **Kevin Tetz**

"Quite simply the most powerful crate engine ever from Chevrolet Performance." That's the advertising copy for the LSX 454R that makes 776 hp and nearly 650 lb-ft of torque, according to Chevrolet Performance. That power is amazing, but it comes at a hefty price. Without listing the exact cost, let's just say it can be more than some project vehicles' total budget. So needless to say, this engine is not for everyone.

Next on deck is what we're playing with: the LSX 454 (no "R" designation) with LS7 cylinder heads making a very strong 627 advertised horsepower. Big-block power from a small-block is awesome. The price tag on the non-race version sits between $10K and $12K, depending on the dealer, and still within arm's reach of the 776hp "R" version when it comes to overall power numbers.

In fairness, there are differences between the two engines internally. The LSX R has a higher compression ratio and runs on race gas only. Our pistons have a D-shaped dish to lower the compression for use with pump gas. So it's not an apples to apples comparison, especially since the 454R is designated as a race only engine.

However, we wanted to see if we could get closer to the R model power levels, stay on pump gas, and do it with catalog parts and a hot cam. Sure, there are differences in the composition of some of the components, but when we bumped the threshold of 730 hp with a simple

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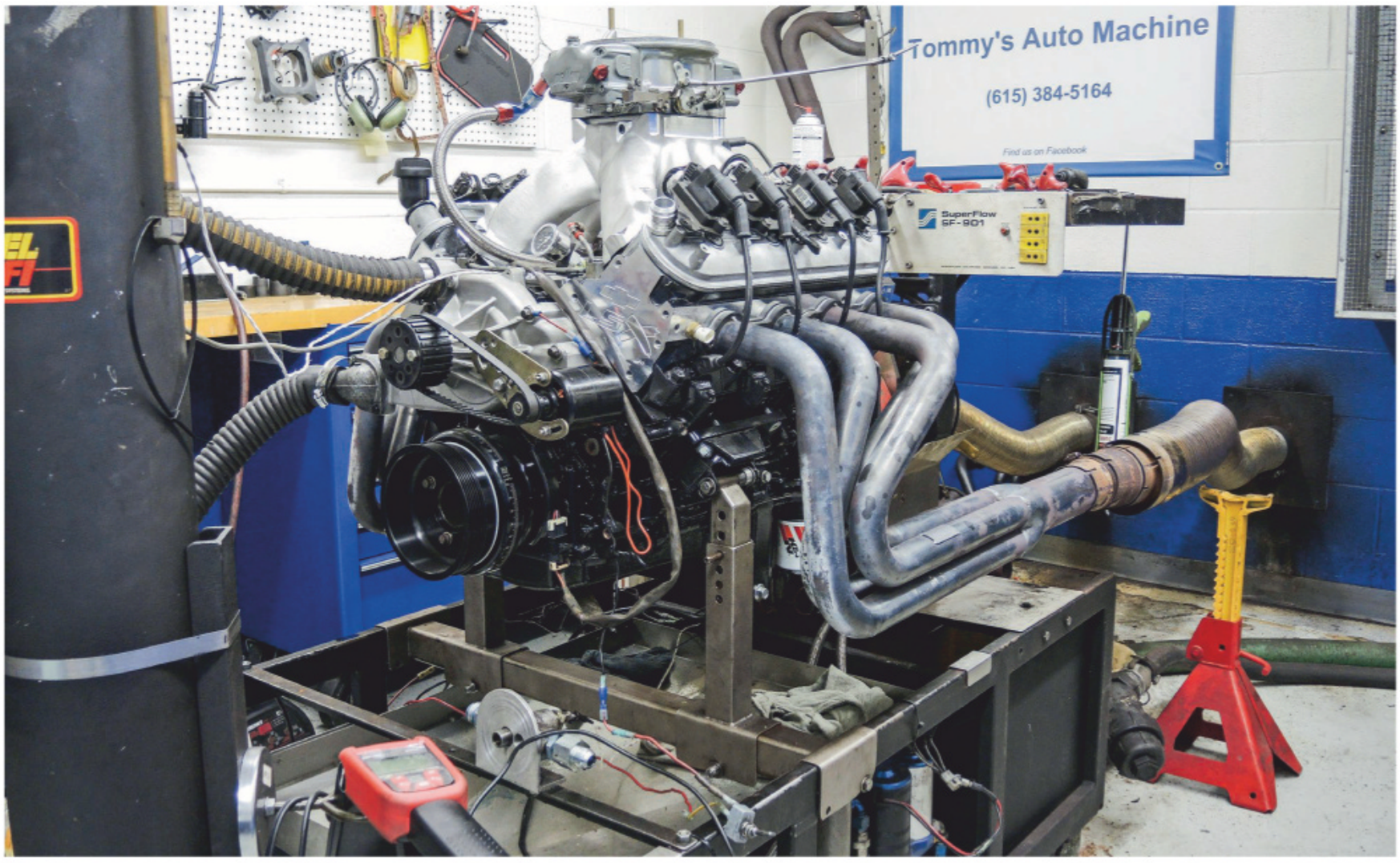

01 | We started out with the stock LSX 454 crate engine (with painted block) that's destined for a super-trick custom Tri-Five pickup. This engine is unaltered, as shipped. These engines don't come with an intake. The Mast Motorsports two-piece, single-plane intake and Demon 1,050-cfm Dominator carb, as well as the 27-degrees of timing will remain our control factors on this experiment before and after the cam and head swap. The LSX is sitting on the dyno at Tommy's Auto Machine in Springfield, Tennessee, loaded with stock coil packs, fresh 30-weight break-in oil, E3 spark plugs, and 1 7/8-inch dyno headers.

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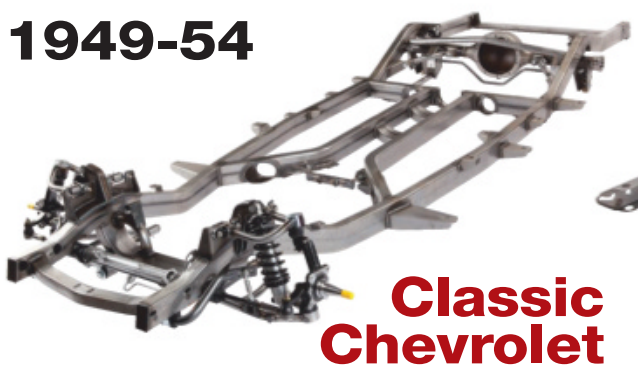
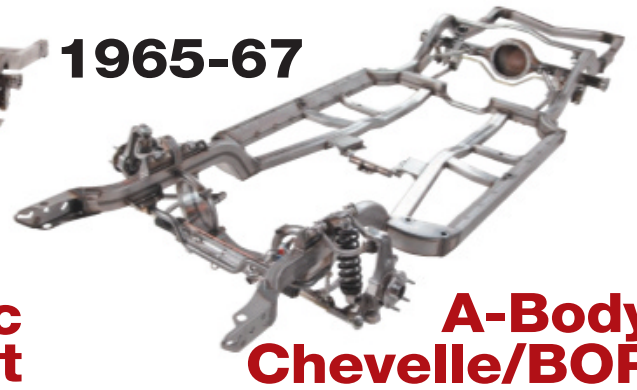


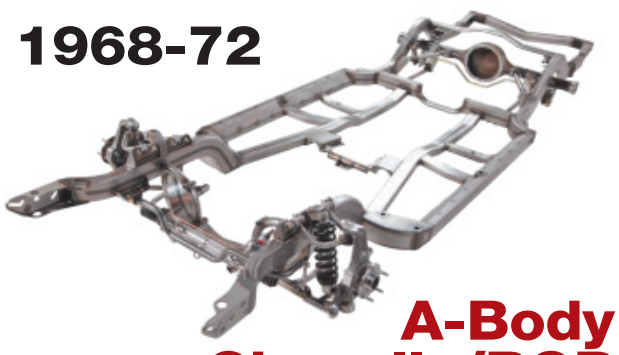
Classic Chevrolet

1965-67



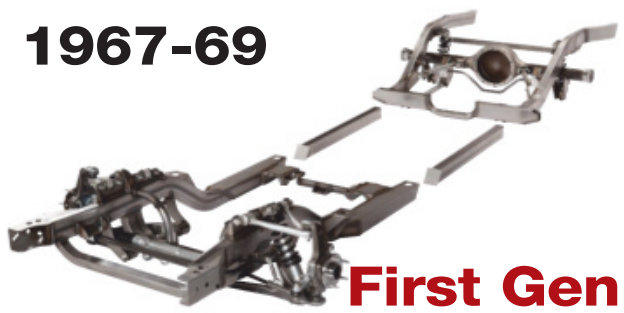
A-Body Chevelle/BOP

1968-72



A-Body Chevelle/BOP

1967-69



First Gen Camaro
(connected subframes)

1959-64

Chevrolet Impala/Biscane/Bel Air

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02 | Tommy's Auto Machine is loaded down with every piece of engine rehab equipment known to the free world. Frank Ofria is the owner/operator and has a history that is deeply rooted in high performance. Coming from California and his father's legendary Valley Head Service, Frank has operated Tommy's for almost 20 years in Tennessee, gaining a solid reputation in the local race community, as well as the Nashville street scene.

03 | The stock (crate engine) cam specs out at 0.635/0.635-inch lift, 236/256-degree duration at 0.050-inch, and a 110-degree lobe separation angle (LSA). Compression is 11:1, but we're still able to use pump gas. We'll run several baseline pulls to verify power once the engine is up to operating temps. We expect a little better than the advertised power levels using the giant 1,050 carb and super-efficient Mast two-piece high-rise manifold.

04 | Frank Ofria checks the humidity levels and records the data into the dyno software to make sure all the readings are accurate. Fuel is metered in and out of the bowls so fuel issues are easily diagnosed.

05 | After a couple of half-throttle pulls, Frank does a full pull to 6,500 rpm and nets 677 hp and 547 lb-ft. At this point most people would declare victory and head to the track, but Bouchard is just getting started now that we have a baseline and stock power level to go by. This shows the benefit of the Mast intake right off the bat.

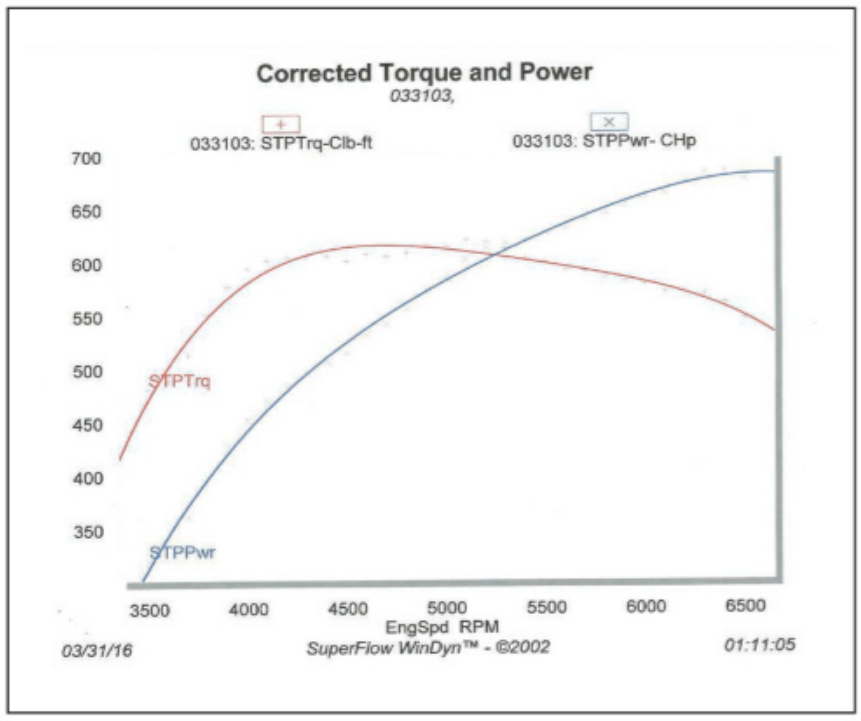
head and cam swap, we got some folks' attention.

Watch how we turned up the wick on an already great engine with a Trick Flow top-end kit and a custom-grind Mast Motorsports camshaft spec'd by John Bouchard.

Race power on street dollars and pump gas? We call that having your cake and eating it, too.

CONCLUSION

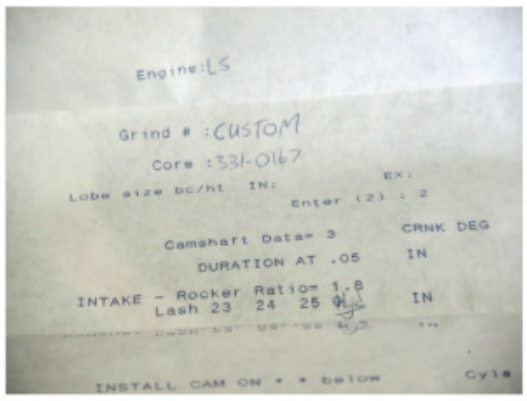
The cost of the top-end kit will run you somewhere in the neighborhood of $2,600. We swapped in the kit over lunch on a Saturday and came within 50 hp of the LSX 454R. If you compare dollars to numbers, a Trick Flow top-end kit makes a whole lot of sense on an LSX-equipped street vehicle. For a full-race application, go with the race engine. If you want another 100 horsepower over the crate LSX, consider this top-end combo. We're not telling you that the two are the same, as there's no free lunch and you get what you pay for. However, with the way most of us drive on the street, you can get real close to race numbers on pump gas while spending a lot less money. You can spend that extra cash on beefing up the driveline and finding ways to get better traction. You're gonna need it. ***CHP***



06 | You can see the torque curve start to drop at 5,300 rpm, but the power curve is smooth and steady all the way up to 6,500. This is what makes this crate package legendary.

07 | Here's a closer look at the Mast intake manifold and the beautiful CNC work on the intake runners. This is not a budget manifold and not what you'd normally run on the street. With the excellent flow potential from the LS heads, the intake can take full advantage of these numbers to make great power.

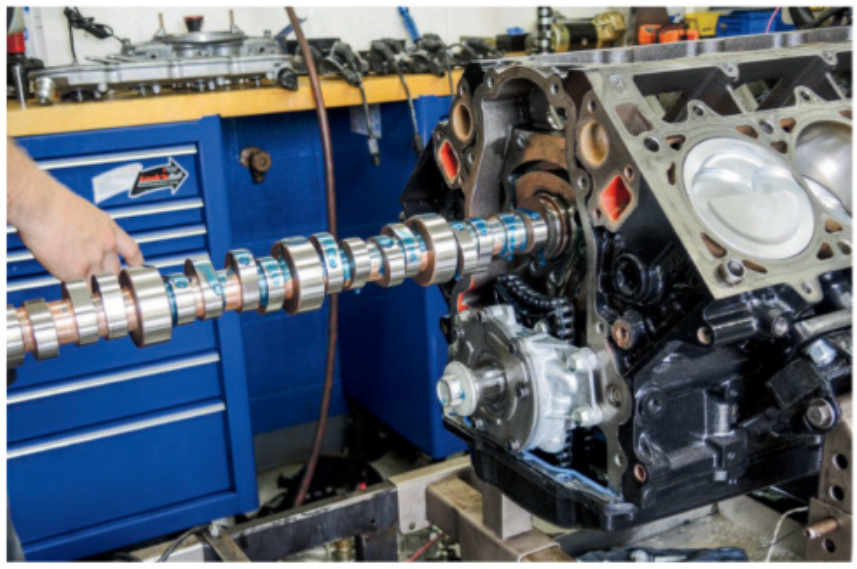
08 | Bouchard pulls the ATI balancer off in preparation for the cam swap. We'll use the same oil and filter with each version to get as close as possible to the same conditions with each set of pulls.



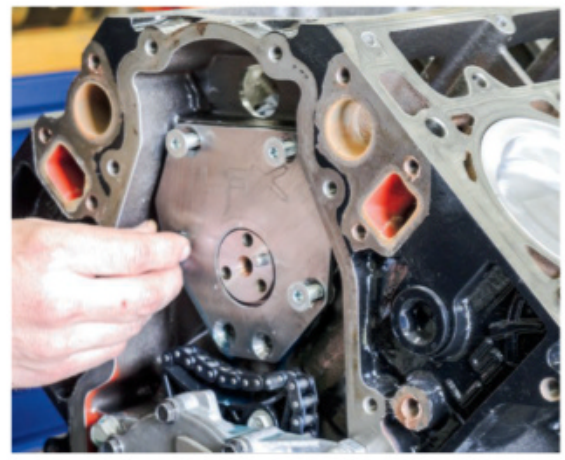
09 | Here's a cool glimpse of the cam card that was in the bag with the new camshaft. Note the "Custom" designation in a handwritten note at the top of the page. Bouchard has had several of his custom grinds given part numbers for the public, maybe this one will as well.

10 | The free-breathing LSX (LS7) heads are carefully removed and will get used on another project.

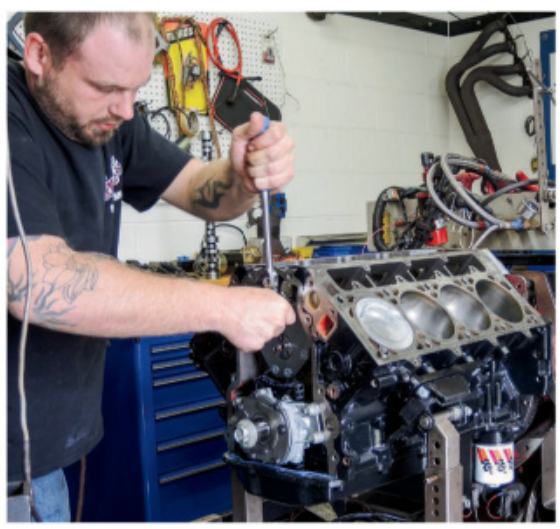
11 | After spinning the cam around clockwise several times to seat the lifters into the plastic lifter trays, the stock cam is carefully removed.



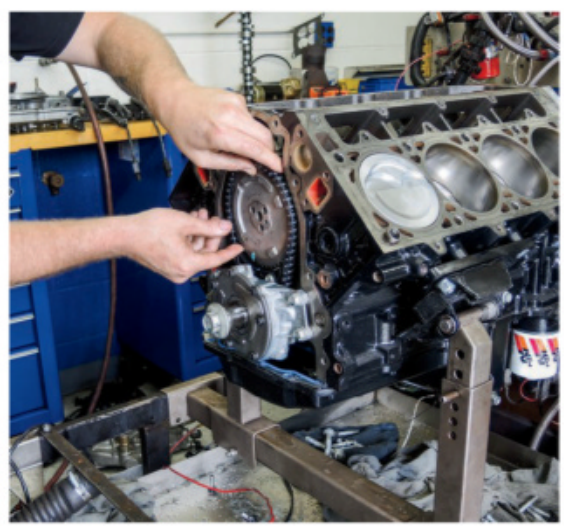
12 | The new Mast cam specs are 0.650/0.635-inch lift, 245/255-degree duration at 0.050, and a 110-degree LSA. With a healthy 9-degree bump in duration on the intake side, Bouchard feels like it will fully take advantage of the flow capabilities of the Trick Flow heads. Generous quantities of cam assembly lube during installation are used to keep the bearings happy.



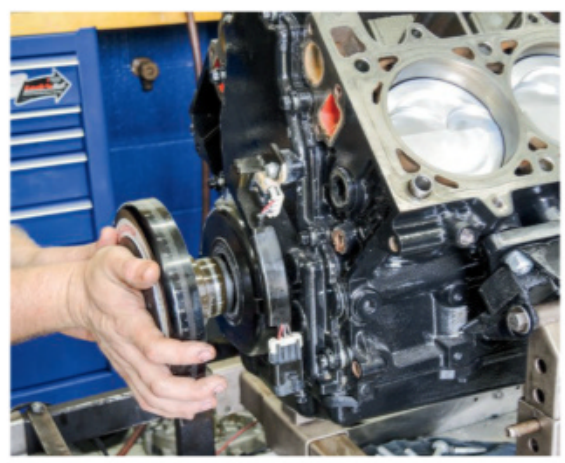
13 | The cam plate is LSX block-specific, so it gets reused. We're making sure not to damage the O-ring.



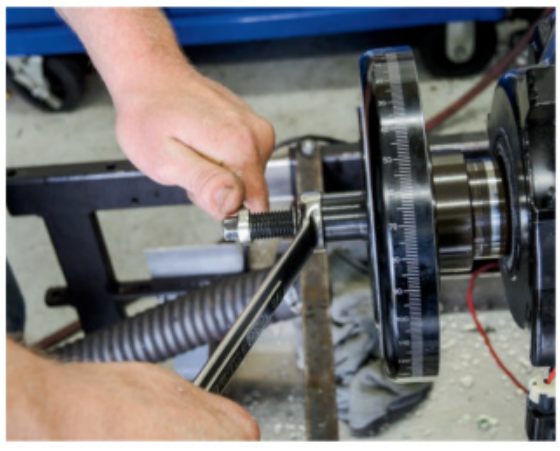
14 | The cam plate is torqued to 18 ft-lb in an even pattern so as not to stress the O-ring.



15 | The upper gear is set back to "straight up" with alignment marks in line.



16 | With the timing cover loosely bolted on, Bouchard shows us a quick trick to align the front seal using the ATI balancer to center the seal over the balancer hub.

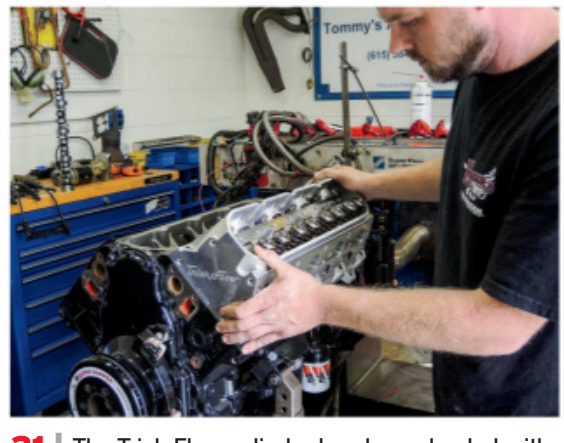


17 | Slowly pressing the balancer onto the crank snout allows you to install to the correct depth while checking the witness marks or wear pattern on the back of the balancer hub.

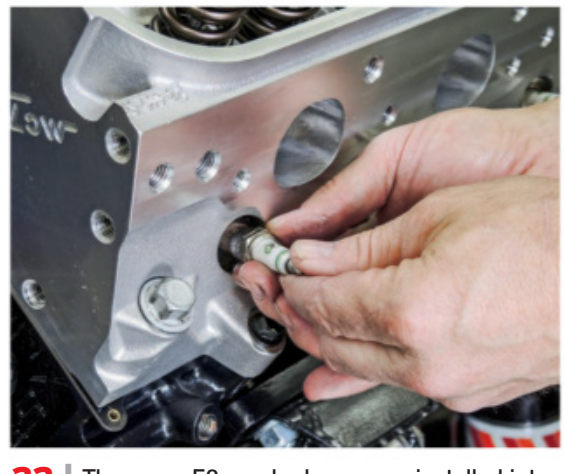
18 | Using a low-torque drill driver, the rest of the bolts get seated on the timing cover in a crosshatch pattern. Gasket technology has improved drastically over the years, and most of the gaskets in this swap were reused.

19 | The exception is the head gaskets. Bouchard didn't want to take chances and installed new Cometic head gaskets and cautions if you're swapping heads in a hurry to read the fine print on the gasket so you don't cover any water passages by mixing them up. Unlike the small-block Chevy, LS head gaskets can be installed incorrectly.

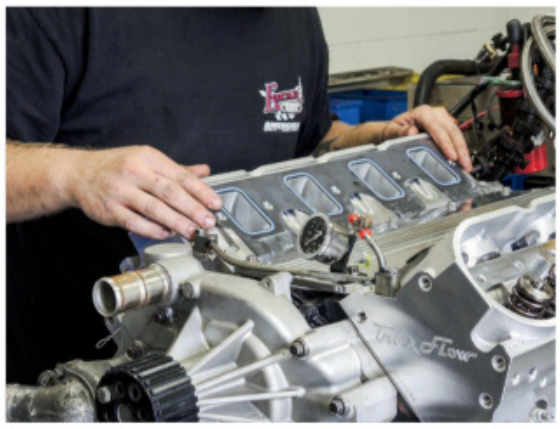
20 | These are the bad-boy Trick Flow GenX 260 LS7 heads. They came fully assembled, and are a definite upgrade.



21 | The Trick Flow cylinder heads are loaded with dual valvesprings and titanium retainers and are secured with new factory head bolts.



22 | The same E3 spark plugs are reinstalled into the Trick Flow heads.



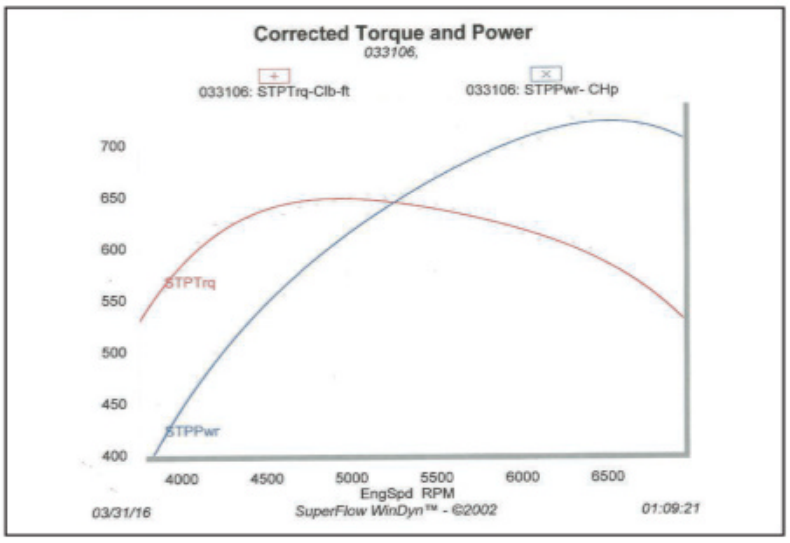
23 | The intake manifold gaskets are installed dry, and are the original set.

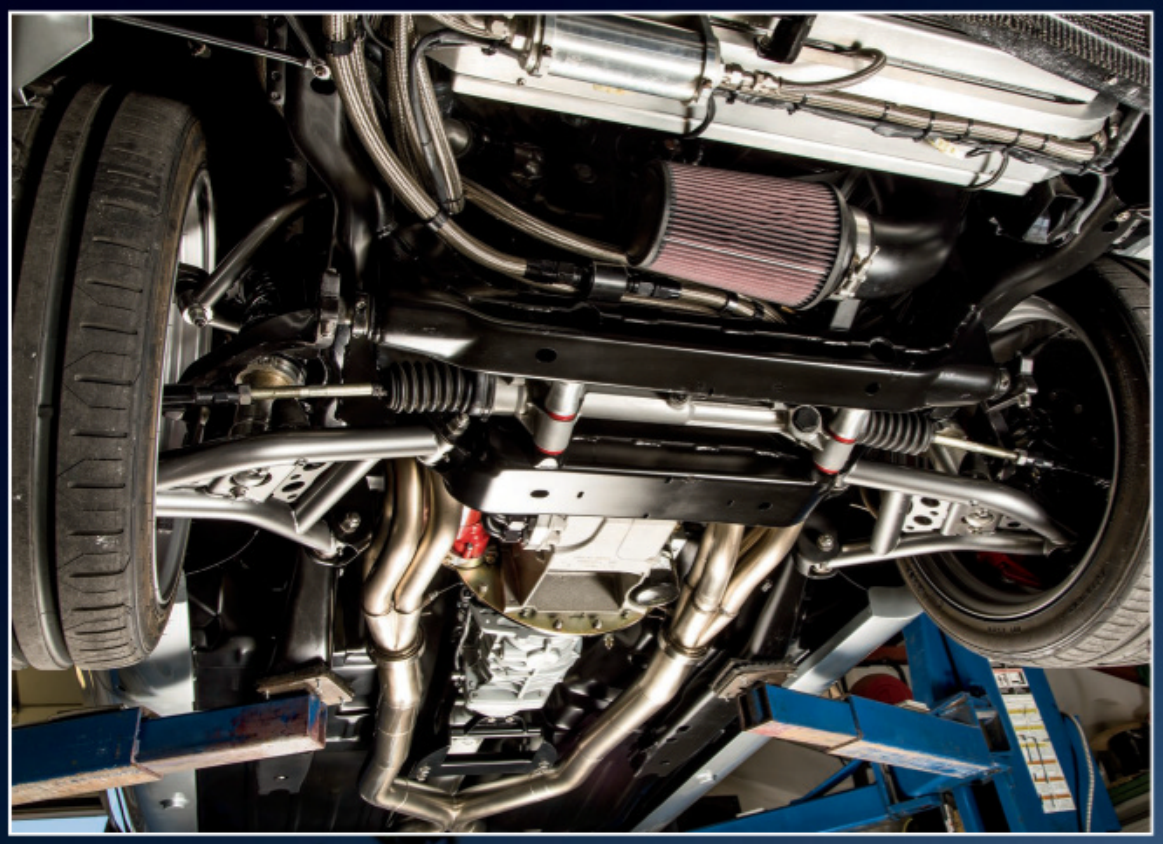
24 | The pushrods and rocker arms are also reused. One of the cool features of the Trick Flow top-end kits is that they're designed to reuse stock components, utilizing their rocker stand, this does require re-checking pushrod length to ensure proper lifter preload.

25 | Here's a closer look at the dual valvesprings and reused stock rocker arms.

26 | Our LSX gets run up to temperature again and Bouchard verifies cylinder temps are even across all eight.

27 | Frank did a couple of warm-up half-throttle pulls, then ran it up to 7,000 rpm, which netted us 728 hp at 6,400. Torque peaked at 640 lb-ft at 5,500 rpm. The power curve is most impressive, climbing steadily and smoothly past 6,500 rpm. The torque curve peaks at big-block, stump pulling numbers and starts to drop off right around where most guys will shift, making this a deadly street combination.





This may come as a surprise, but the total performance of a car is more than the sum of its parts. I mean, yeah, exotic gear *can* make a car impressive. But after two decades featuring what are considered the industry's finest examples of their respective breeds, I'm here to tell you that you'd be shocked at just how poorly some of these cars actually perform. To put it quite literally, parts horses look strong only on paper.

And while most of us can justify a car that only looks and sounds good, some can't. Imagine, for example, if a renowned NASCAR team owner showed up to an autocross with a car that sneezed or loaded up or couldn't do a lap without killing every third cone. You'd laugh. And that's bad for business.

So when Rick Hendrick set about to build a Pro Touring car a dozen or so years ago, it made sense that he wanted something that could actually uphold the promise that its parts made on its behalf. Most of us would have assumed the obvious choice was for Rick to have Hendrick Motorsports build a car. But sidetracking your moneymaking side to indulge your fantasies is also bad for business. Rick needed someone who could build a race car that merely *looked* like all the fancy cars that appear in magazines.

He found his candidate in Kent Waters. "I came out of NASCAR," he begins, describing his 14-year career with Bill Elliott. "Growing up at the Elliott shop, I got to work in the chassis shop, the paint-and-body shop, the engine shop. That put me in the position to build a car from scratch." But when Elliott

RIDES

THE WOLF IN WOLF'S CLOTHING

When the mere appearance of performance simply won't do

TEXT & PHOTOS: **Chris Shelton**

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The Wolf in Wolf's Clothing

sold his team, Kent shifted careers and started building cars from scratch. "I took all the stuff that I learned in NASCAR and applied it to hot rods. The measurements and the metalwork transferred over into this."

The project was actually an evolution of an existing relationship. "I went with him as a consultant to several auctions to buy a lot of cars," Kent continues. Inevitably, they started bench racing. "At the time he was building what's known now as Hendrick Performance," Kent says (it's the hot rod/muscle car arm of the business). "They didn't have their deal quite up and running then so he was hiring people like me to build cars."

What makes the car Kent built for Rick special is largely invisible at first glance. For example, Kent cut out the floors and welded 3x3 tubing along the inside of each rocker panel. "That's not a console down the middle," he explains. "It's actually a spine that runs the length of the body. All that stuff in the back seat, that's all welded to the car." An 0.085-inch-wall 4130 'cage turns the car into a space frame of sorts. "That car's a full chassis car, but the body is welded to it. We were doing everything we could to make the car as torsionally rigid as possible." He also welded every seam in the car. "There are no more spot welds," he says.

As race car builders are known to say, reducing weight is like adding horsepower. So to offset all the tubing in the car, Kent nibbled where opportunity arose. "Whenever I took the skin off the car, I drilled the inner

structure," he says. "That took like 150 pounds out of the body."

The weight-loss regimen extends to what bolts to the body. He replaced the fenders, trunk lid, and bumpers with aluminum proofing (prototyping) panels from Auto Metal Direct. Anvil made the hood from carbon fiber. If a part could be rendered in lighter composites, Kent had it done. For example, Hendrick splashed the billet Anvil front apron opening and made a new one from carbon fiber. The same goes for the gauge insert that Kent originally made from steel. Hendrick made even the taillight reflectors and the various interior closeouts from lightweight carbon. "I think it should've been lighter than it is but it wasn't but 3,200 pounds," Kent says, adding that weight distribution is almost perfect front-to-rear. And get this: similar to a race car, Kent put doors on the ends of those 3x3 tubes behind the rocker panels. "That way you can ballast the car to get the weight exactly where you want it." Again, race car stuff.

In the spirit of tuning, Kent had antiroll bars made in diameters from 3/8-inch to 1-inch. Altering the Panhard bar height tunes the rear suspension's roll center, so Kent made it accessible without jacking the car by a removable trunk panel. "Just like a NASCAR," he says. Detroit Speed put

the compression and rebound knobs in the reservoirs so Kent made them easily accessible from the topside of the car. "I built this car to go kick ass," he proclaims.

Being a Chevrolet dealer, specifically one with clout, Rick was one of the first people to get the engine when it came out in the Corvette. "This was before they were even available as a crate," Kent says. "He came down to the shop one day and went home that night and decided that he wanted that engine." But there was only one problem: Kent built the car around another engine, and given the tight packaging there was no room for the new engine's dry-sump and supercharger, among other things. "We had to take out all the suspension, the exhaust, all the stuff that we built, and even rebuild part of the firewall to install that engine," he says. The exhaust port and block differences mandated new headers and even custom motor mount brackets. "All

those changes took almost another year," Kent admits.

Rick Hendrick took delivery in about 2013. He sold the car in 2017 because, well, that's what you do when you have a rotating collection. That Rick Hendrick wanted to promote the hot rod shop that bears his name (Hendrick Performance) probably factored into the decision. The car sold to Spokane enthusiast Erik Humble who more recently passed the keys to Keith Byer.

That this car remains aesthetically viable half a dozen years after its completion speaks volumes. By emphasizing *actual* performance—the way a car drives, handles, and behaves—rather than the veil of performance—how flashy it looks—it's possible to build a leader rather than just another follower. **CHP**

TECH CHECK

Owner: Keith Byer, West Bloomfield, Michigan
Vehicle: 1969 Camaro

Engine

- **Type:** LS9
- **Displacement:** 6.2 L/376 ci
- **Compression Ratio:** 9.1:1
- **Bore:** 4.065 inches
- **Stroke:** 3.622 inches
- **Cylinder Heads:** GM with L92-style ports, 68cc chambers
- **Valvetrain:** Titanium 2.16-inch intake, sodium-filled stainless 1.59-inch exhaust valves; investment-cast roller-trunnion 1.7:1 rockers
- **Camshaft:** 0.562/0.558-inch lift, 211/230-deg. duration at 0.050-inch
- **Induction:** Eaton LSA/LS9 screw-type 2.3L blower with integral dual-brick air-to-water intercooler, Lingenfelter 2.6-inch pulley (19-percent overdrive)
- **Accessory Drive:** GM and Concept 1 components
- **Exhaust:** 1 7/8-inch stainless headers, 3-inch stainless primary system by Kent Waters, Borla mufflers
- **Output:** 676 hp, 660 lb-ft

Drivetrain

- **Transmission:** TREMEC TKO-600 (prepped for road racing)
- **Rear Axle:** Ford 9-inch, 3.73:1 gears, Truetrac limited-slip carrier

Chassis

- **Steering:** Detroit Speed rack
- **Front Suspension:** Detroit Speed hydroformed subframe and double-wishbone suspension with forged-aluminum Corvette steering knuckles
- **Rear Suspension:** Detroit Speed QUADRALink with adjustable Panhard bar
- **Dampers:** Detroit Speed-valved double-adjustable remote-reservoir coilovers
- **Brakes:** Brembo 14-inch carbon-ceramic rotors, six-piston calipers front and rear; Stainless Steel Brakes Corp. stainless master cylinder

Wheels & Tires

- **Wheels:** Forgeline GZ3 19x10 front, 19x12 rear
- **Tires:** Nitto Invo 275/35 front, 325/30 rear

Interior

- **Seats:** Recaro
- **Upholstery:** Wayne Lundy Interiors (Lula, GA)
- **Dash:** Handbuilt steel by Kent Waters, handformed dashpad
- **Instrumentation:** ProParts Spek-Pro, Hendrick Performance carbon-fiber insert
- **Steering:** Flaming River Waterfall wheel
- **HVAC:** Vintage Air, Clayton Machine Works vents

Exterior

- **Body Prep and Paint:** Trent Crane and Kent Waters
- **Paint:** Axalta Standox, 2012 Porsche Platinum Silver Metallic
- **Modifications:** Driprails replaced with 16-gauge steel sheet

CAM LOGIC

We dig into the differences between flat tappet and roller tappet cams

TEXT: **Jim Smart** | PHOTOS: **the Author** AND **Manufacturers**

Do you know how to choose a camshaft? This seems like a simple task because most of us understand what we want from an engine. However, propose this question to 50 Chevy fanatics and you're bound to receive about as many differing answers because everyone wants something different. Some want that "*rumpity-rump-rump*" badass idle followed by the roar of power when their foot hits the gas. Others like a civilized idle and good cruising manners. Here's another question: flat tappet or roller tappet, and why? Some swear by flat tappet camshafts while others who made the switch to roller will never go back.

We're going to present you with the facts and you can decide what's best for your application. The humble, spinning reciprocating flat tappet has been a proven performer for nearly as long as there have been internal combustion engines. Yet, in more recent years the roller tappet has been making inroads into production engines and enthusiast builds because of its efficiency and broader range of performance options.

Engines long had mechanical flat tappets that required periodic valve lash adjustment. Cadillac was the first American automaker to put hydraulic lifters in an engine back in 1930, which reduced the amount of maintenance required. One-by-one, other automakers followed suit.

GET THE HOOKUP

Burbank Speed & Machine
818.846.8310
burbankspeedmachine.com

Crower Cams
619.661.6477
crower.com

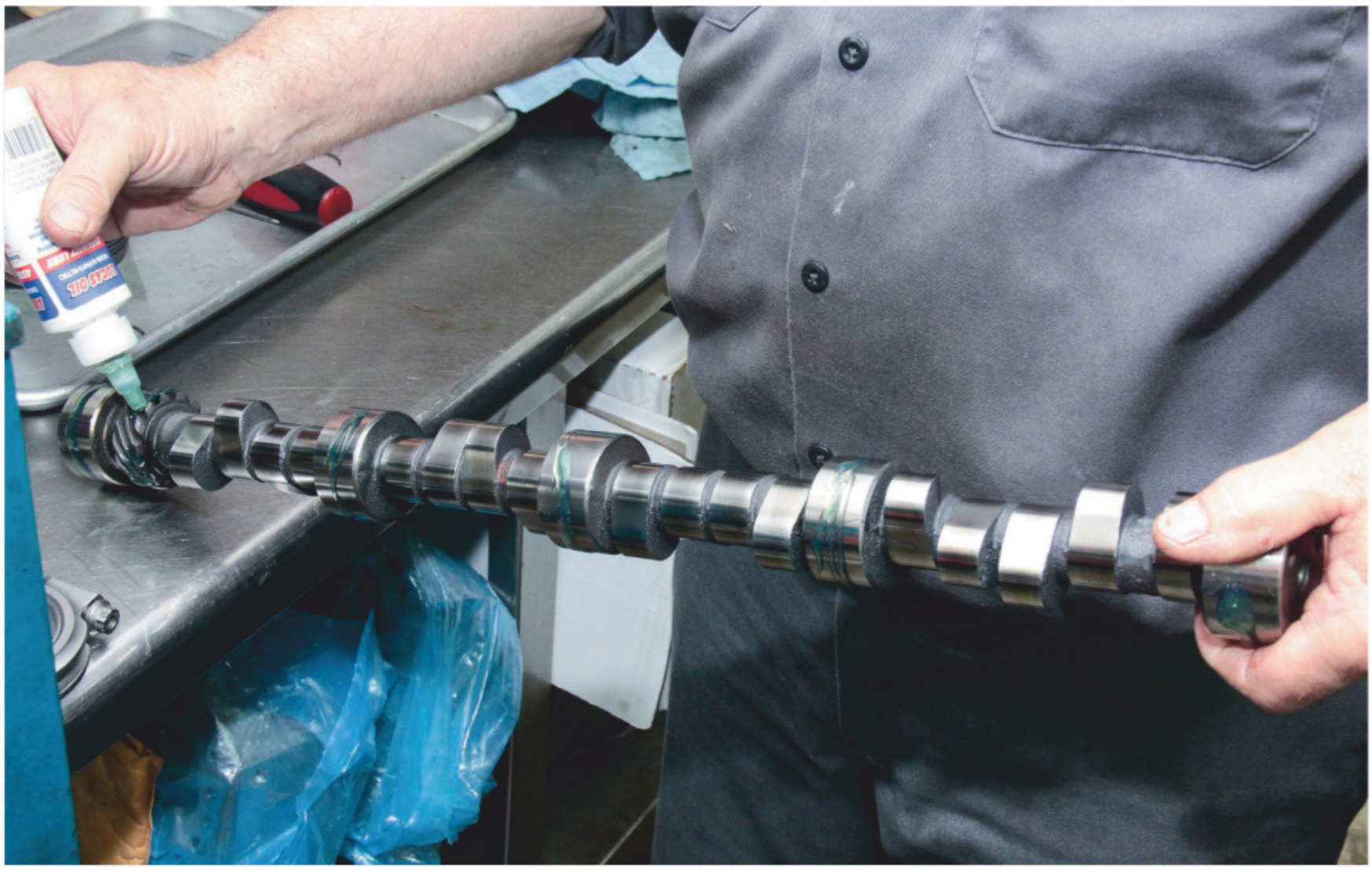
Jesel
732.901.1800
jesel.com

John Gulius Race Engines
570.829.0385

Summit Racing Equipment
800.230.3030
summitracing.com

Torco Advanced Lubricants
909.980.1495
torcousa.com

Hydraulic lifters maintain valve lash via oil pressure on the plunger inside the lifter when the engine is running. The plunger maintains pressure against the pushrod, which applies pressure to the rocker arm to keep a minimum clearance at the valve stem. The lifter keeps valve lash snug to where there's no play between the rocker arm and the valve stem. As the cam, lifter, pushrod, rocker arm, and valve stem tip wear, the lifter keeps up with the wear. Hydraulic lifters fail when they cannot hold pressure at the plunger and thus collapse, causing noisy rocker arm function. And without oil pressure from a healthy



oil pump and precision bearing clearances, lifters collapse and valve lash becomes excessive and noisy.

Mechanical tappets are solid and void of a plunger. Valve lash is adjusted mechanically at the valve stem, netting a nice, soft chatter performance buffs love to hear in a high-performance engine. Valve lash clearances are typically around 0.010- to 0.020-inch at the valve stem and rocker tip. Mechanical tappets are also more tolerant of radical cam profiles and high-rpm operation. They maintain constant valve lash at all rpm ranges.

FLAT TAPPET

Flat tappets have a time-proven performance history. They've won a lot of races and have served untold billions of people very well. The flat tappet advantage is less mass and weight compared to a roller tappet. Although it is easy to assume the flat tappet rides the cam lobe dead center. Nothing could be further from the truth. The flat tappet, be it hydraulic or mechanical, rides slightly to one side of the cam lobe, which causes the lifter to spin on the lobe for more uniform wear. Flat tappet lifters are actually not flat. They have a slight crown on the face of the lifter. The cam lobe is machined with a slight taper, which causes the lifter to ride the taper allowing the lifter to spin as it rides the lobe.

Where flat tappets get into trouble is oil starvation, improper valve lash adjustment, excessive valvespring pressure, and/or improper break-in. A flat tappet cam's most critical moment is during that first firing. You must have a zinc additive in your engine oil to enable the tappets to work-harden the cam lobes so they will live a long time. Torco Break-In Engine Oil (SAE 30) for engine builders contains zinc and other additives important to proper cam lobe work-hardening during that critical first firing and break-in. Fire the engine and let it run at 2,500 rpm for 30 minutes to work-harden the lobes. Continue to run a zinc additive or a diesel-specific engine oil after the break-in.

And one more thing. When you're installing a flat tappet camshaft, use the correct assembly lubricant. Cam journals get engine assembly lube. Cam lobes get moly lube, which is that charcoal gray slippery stuff that helps tappets work-harden the cam lobes.

Flat tappet cams are more affordable than their roller counterparts. This factor makes them

01 | When you position a flat tappet and roller tappet cam side-by-side you can see the differences. The flat-tappet cam (left) is cast iron, which is softer than the hard steel billet roller cam (right) and has lobes that are distinctly different in shape. The roller tappet cam offers a bolder profile that enables greater levels of performance while also reducing friction.

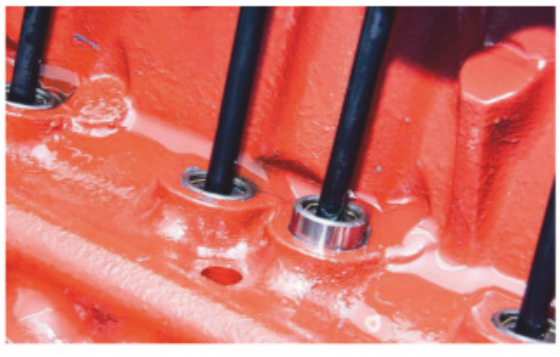
02 | Here's another look at a flat tappet camshaft alongside a roller tappet cam courtesy of Crower Cams. When you observe the lobe profiles the difference is clear. You can shape roller cam lobes any way desired to get the levels of performance wanted. Lobes can be machined to open the valve differently than it closes, and vice-versa.

03 | Here are a couple of flat tappet hydraulic lifters. They're identifiable as hydraulics by the internal plunger, which is retained by the C-clip inside the top of the lifter.

04 | A flat tappet camshaft is set up where the lobe and lifter ride against each other where the lifter spins on the cam lobe. The lifter must spin on the lobe to prevent destructive and unnecessary wear. Flat tappet cam break-in is critical to long life. The lifter and lobe must be coated with moly lube to work-harden both the lobe and the lifter. Then, you want a steady diet of engine oil with a zinc additive.

05 | Flat tappets are coated with moly lube during installation to give the lobe and lifter a fighting chance at endurance. Never coat the journals with moly lube. Use engine assembly lube on the cam journals.

06 | Note how this flat tappet camshaft is prepared for installation with moly lube on the lobes and engine assembly lube on the journals.



07 | Flat tappets sit deep in the lifter bores. They should be soaked in hot engine oil with a zinc additive and allowed to soak overnight for good penetration.

08 | Here's a pair of linked Crower roller tappets. Crower manufacturers all of its lifters in its own factory in California. Nothing is offshore due to Crower's strict attention to quality and race-ready products.

more appealing going in. However, the benefits of low cost in the flat tappet cam are quickly forgotten when you learn the benefits of a roller tappet cam.

ROLLER TAPPET

The benefits of roller tappet camshafts are immediately apparent because they reduce internal friction, allow for a more aggressive lobe profile, and they like the high revs. The real beauty of roller tappet camshafts is endurance, which means they have an unlimited lifespan. You can reuse them again and again. The greater benefit of roller tappet camshafts is you can opt for a more aggressive cam profile without the lifters digging into the lobes like with flat tappet cams.

Another nice thing about roller tappet camshafts is how the roller tappets ride the lobes without interruption. They never leave the lobes, maintaining solid contact throughout. And because you have a roller riding the lobe, there's reduced friction. When you reduce an engine's internal friction you free up power otherwise lost to friction. Lifters generally come two ways: linked or in a holder, like in LS engines.

REDUCING INTERNAL FRICTION

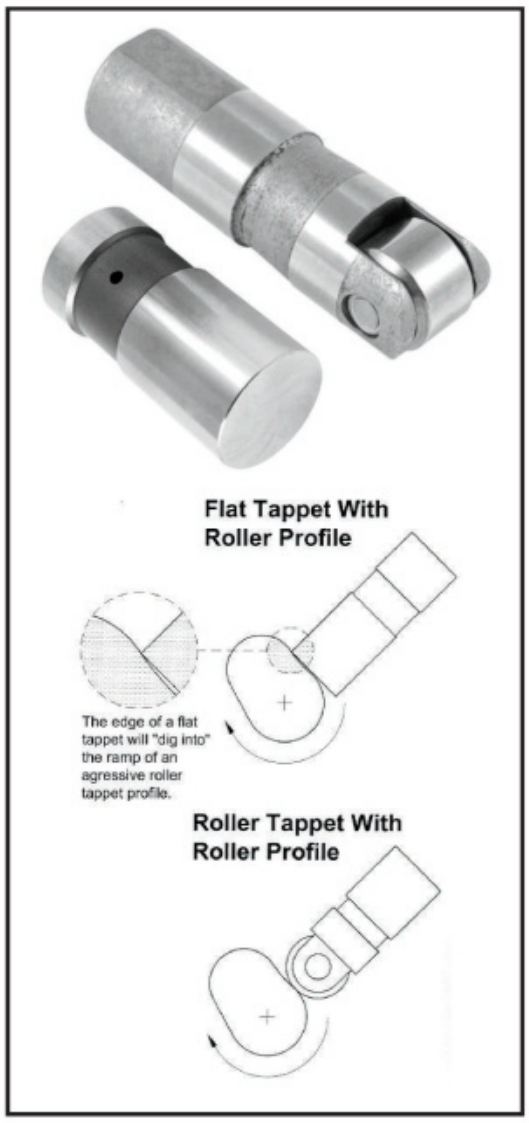
Roller tappets are the point-of-entry for reducing internal friction in an engine, but there's more. Roller rocker arms reduce friction at the valves. You will find roller rockers are available two ways: bushing or needle bearing. Rocker arms with roller bearings offer the least friction followed by bushings, which are not as efficient. Roller bearings at the rocker arm fulcrum and tip reduce friction even further. However, needle bearings at the fulcrum and tip make a rocker arm more costly. Lifter bore sleeves in the block reduce friction and make the lifter more stable. Torrington bearings at the timing sprocket further reduce friction and free up power.

Whatever approach you take with your camshaft and valvetrain, opt for the greatest amount of efficiency possible while remaining within your budget. If you go roller technology from cam to valve stem expect to spend a lot of money in the short term while saving money and freeing up power over the long haul. The advantages of going roller are obvious. The best way to look at flat tappet versus roller tappet is the long-term investment by going roller. ***CHP***

09 | Here are the two types of roller tappets side-by-side. On the left are mechanical lifters (tappets) void of the oil holes you see with hydraulic lifters. On the right are hydraulic roller tappets with oil supply holes to support the plunger and take up valve lash. Mechanical lifters are solid and void of a plunger. Hydraulic lifters will have a C-clip and a floating plunger inside.

10 | The solid mechanical roller tappet is void of a plunger and C-clip.

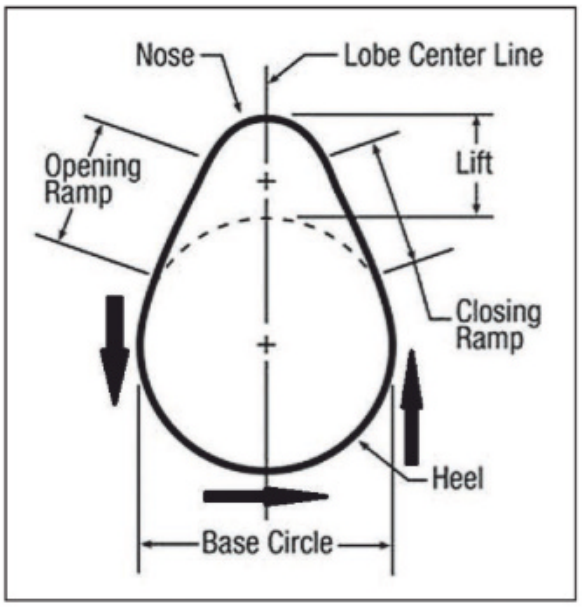
11 | Hydraulic roller tappets sport the plunger and a C-clip. One area to watch for is the C-clip installation, which must be solid and deep in the groove.



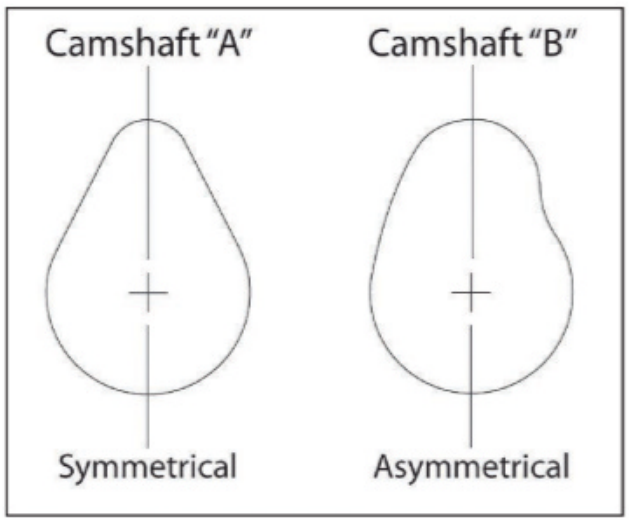
12 | When you examine the dynamics of the flat tappet cam lobe and the roller tappet cam it is easy to see why the roller wins out. A roller tappet can ride the wildest of cam profiles and come back for more. A flat tappet cam is limited.

Cam Logic

13 | These are the basic dynamics of a flat tappet camshaft lobe. These are elements that apply to both roller and flat tappet cam lobes. However, the lobe shape is more like we see with a flat tappet cam lobe.



14 | Roller cam lobes can be symmetrical or asymmetrical. The symmetrical lobe offers the same rate of valve opening and closing on both sides of the lobe. An asymmetrical lobe offers a different attitude from one side of the lobe to the other.

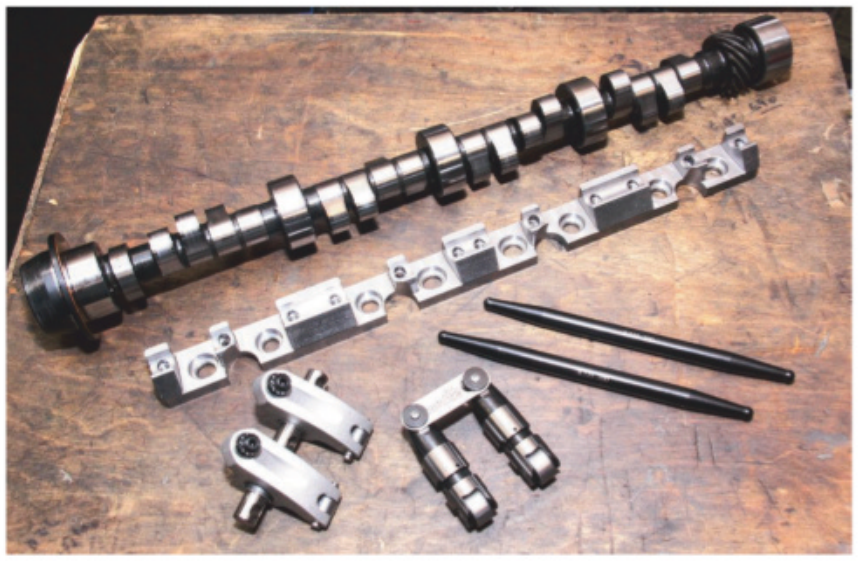


15 | Here's a small base circle roller camshaft from Crower's inventory. You should opt for a small base circle camshaft when you're running a stroker crankshaft. The small base circle may be necessary for the rod bolts to clear the camshaft.

16 | The Gen IV and V Chevrolet small-block engines were engineered to run only with a roller tappet camshaft. Here's one example of what you might see for the Gen IV and V engines. Check out the very aggressive cam lobe on this stick. Note the Torrington bearing at the cam sprocket for reduced friction.

17 | Most camshafts are identified at one end, which makes it easier to trace the grind. This is a Sig Erson camshaft, which makes it possible to look these numbers up.

18 | Jesel produces race-ready valvetrain components, which are available from Summit Racing Equipment. This package, which was captured in John Gulius' race shop in Wilkes-Barre, Pennsylvania, enables you to install shaft-mounted roller rocker arms on a small-block Chevy. The Jesel products offer both stability and low-friction.



19 | Earlier, we mentioned lifter bore sleeves, which offer stability and reduced friction. Note how these sleeves in a small-block Chevy at John Gulius Race Engines are honed for good oil control.

20 | During a recent visit to Crower, the folks laid out the manufacturing process for us showing their roller tappets, which are produced in-house. From left to right, Crower begins the lifter birth process with a solid piece of billet and begins machining from there. At the far right you have a completed roller tappet ready for installation.

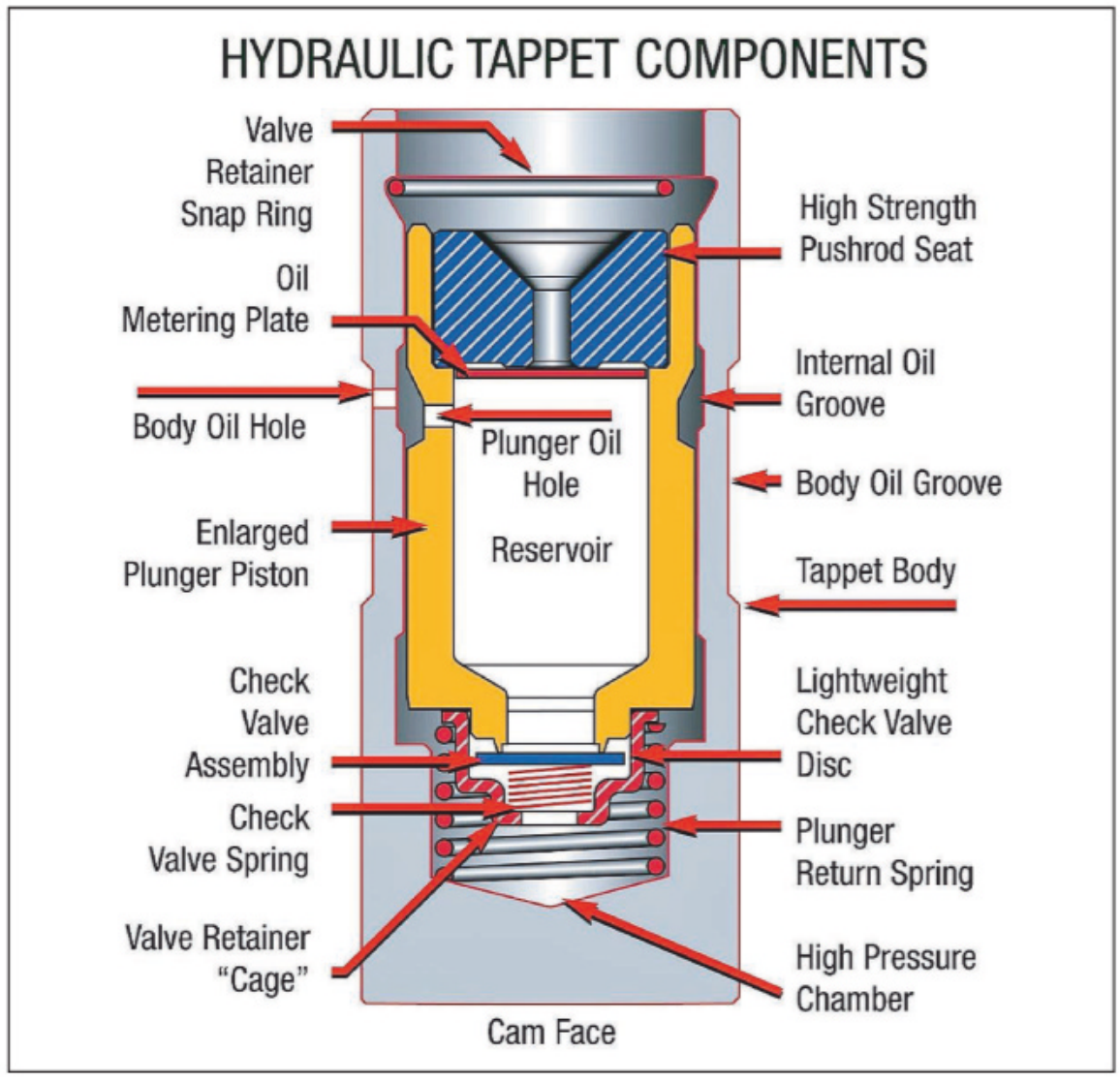
21 | Friction reduction is further enhanced with a roller tip rocker arm. This is a stamped steel low-buck rocker arm nearly anyone can afford. What it means for you is less wear and tear at the valve stem along with reduced internal friction.

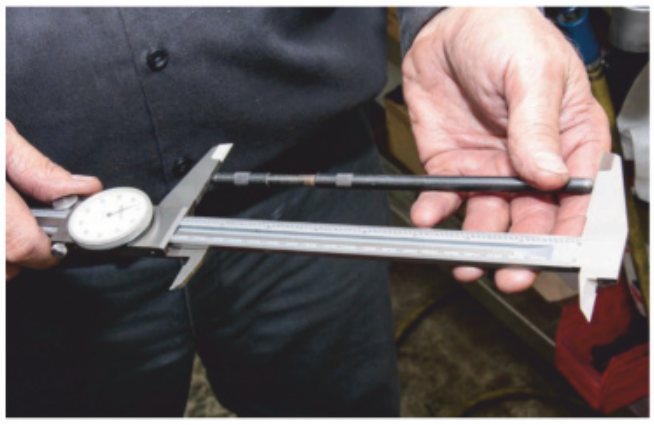
22 | Check out these shaft-mounted Jesel rocker arms from Summit Racing Equipment. These are the ultimate friction reducers coupled with an aggressive rocker arm ratio for added lift.

23 | Crower makes these race-ready roller rockers, which multiply lift and offer smooth function at the fulcrum. These shaft-mounted rockers sport needle bearings at the fulcrum and at the tip.

24 | Dave Akard at Burbank Speed & Machine likes these cam sprocket Torrington bearings, which further reduce internal friction at the cam sprocket. These are common to Gen IV and V small-block engines. However, they are also available for classic small- and big-block engines.

25 | Not enough thought is given to valvespring pressure, which is determined by cam profile. You must have spring pressures compatible with the cam profile. Too much spring pressure for lobe lift and you can wipe a flat tappet camshaft in short order. Purchase your cam as a kit with compatible valvesprings.





26 | Dave Akard stresses the importance of proper valvetrain geometry. Pushrod length directly affects valvetrain geometry. Invest in a pushrod checker and set up your rocker arm geometry at the valve stem.

27 | On top, we get a closer look at rocker arm geometry and how it affects the valve stem. You want the rocker tip centered on the valve stem from the time the valve begins to open until it closes. Side loads on the valve stem will eat up the stems and guides.

28 | Torco TBO Premium Break-in Oil is what you should use to break in a new engine because the first firing of a fresh engine is critical to longevity. Protective anti-wear chemistry allows mating surfaces to gently wear in during break-in. Torco TBO contains a high percentage of Zinc anti-wear chemistry for proper valvetrain and new cam break-in protection.

29 | Torco SR-1 Catalytic Converter Safe and SR-1R are special blends of highly advanced synthetic base oils and proprietary additive systems aimed at increasing power, efficiency, and engine protection. Synthetic engine oil is what you want for longevity and less wear and tear. For late-model engines with tight tolerances, opt for 0W20 or 5W30. Older engines will want 10W40 or 20W50.

Tommy Franklin says, "I have been involved with cars since I was born. My dad has always had street rods and race cars, so I was hooked from the start. I helped him work on his cars and discovered a passion for them and for racing and have never wanted anything different. I built this car to simply be a cruiser, something that I could go out and have a nice ride and drive, and lots of power."

This car just didn't drop from the heavens one night and decide to stay. It had been making the rounds within the family circle, both close in and extended, for decades. It was no less a member of the clan than the two-legged creatures that live there. When Tommy was about 12, he began seeing the Camaro around a lot because it belonged to a coworker and friend. From then on, it was like a thread, and the more you pulled the more the thread unraveled. Was there a lump of coal at the end of it … or a bright, shiny piece of kryptonite?

According to Tommy, the car was sold to a family member and then passed along to several others when the time was right. But curiously, he got it from a friend, not a blood relative. And the other thing was that he wasn't in a real hurry to get started. The Camaro sat for years. But the vision never evaporated. It nagged; he couldn't help but buy things for it from his favorite outfitters at Detroit Speed, Inc.

He says he struggled to find the time to actually do the build … until he realized that it would never happen with him alone. He's got a lot more on his mind, better things to do to provide support. He's an entrepreneur and a businessman. He owns a huge commercial

RIDES

NATIVE

Circle for this Camaro cruiser curiously comes complete

TEXT: **Ro McGonegal** | PHOTOS: **Alex Stivaletti**

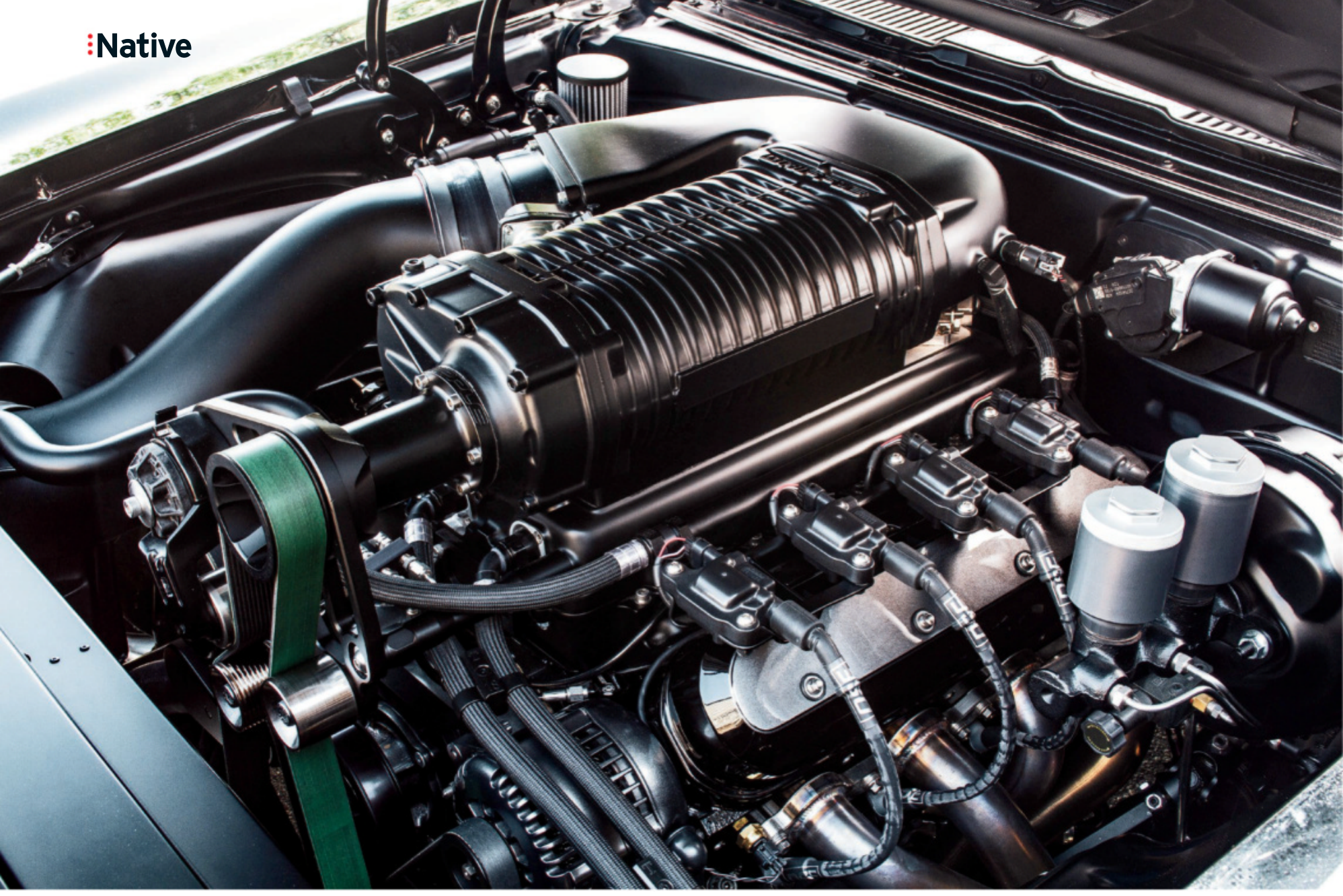
electrical service, active mainly in Maryland and Virginia. He races a top-notch PDRA Pro Mod '69 Camaro prodded by a Pat Musi bullet.

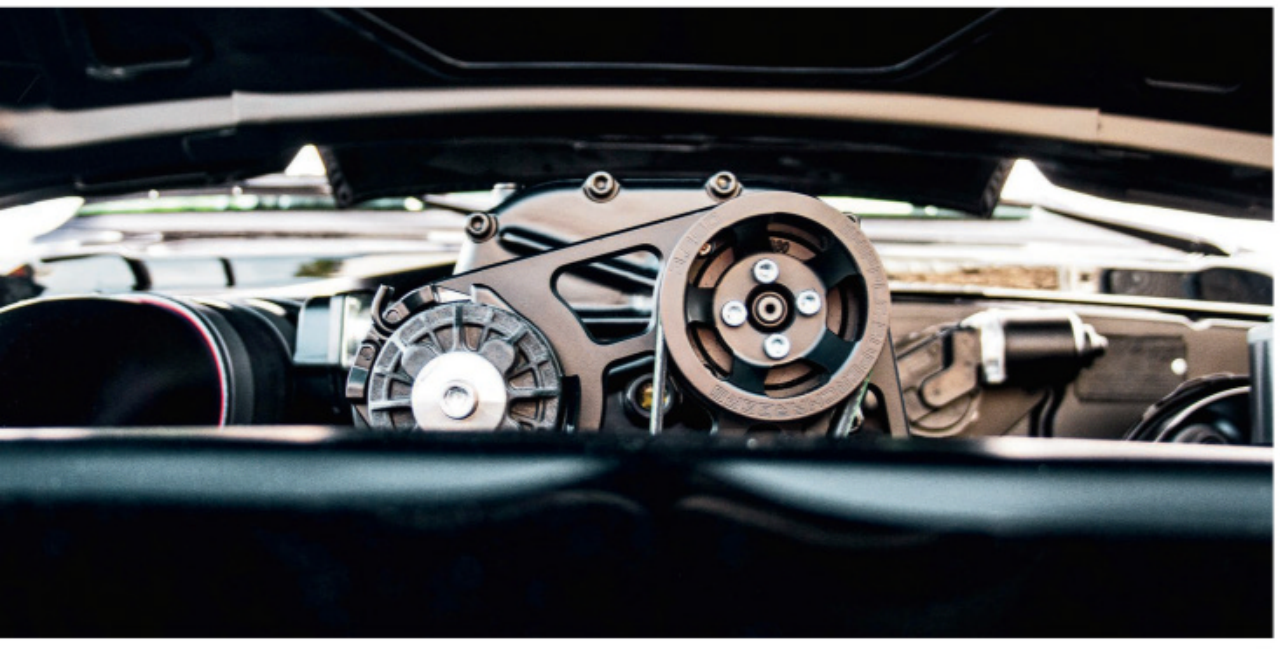
Recently, he's taken ownership of Virginia Motorsports Park. So he's got lots to do without even thinking about Pro Touring. Considering all this, he would have Detroit Speed resurrect the Camaro.

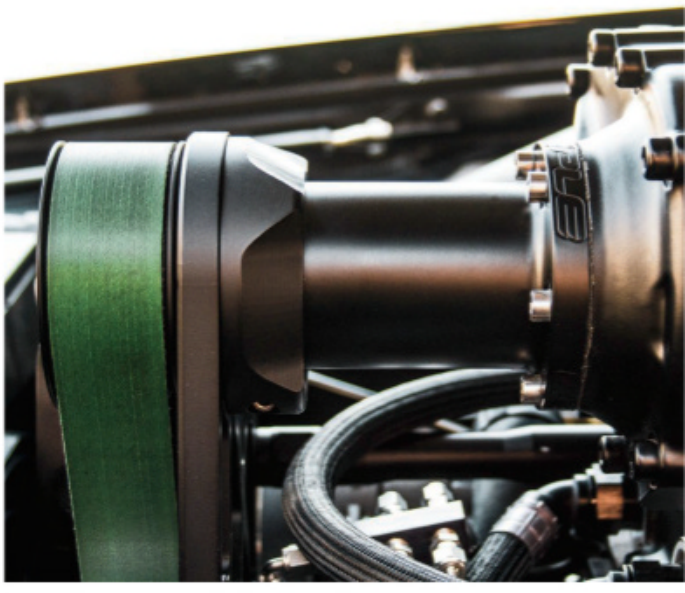
"Once the car got there to be finished," Tommy said, "the scope of the project grew. They essentially did a makeover and took it to a level of perfection. I really like nice things and lots of power. With the help of Detroit Speed and good friend Pat Musi I am not lacking either."

Tommy had a structurally sound envelope but one that needed a little

SEE MORE PHOTOS AT CHEVYHIPERFORMANCE.COM





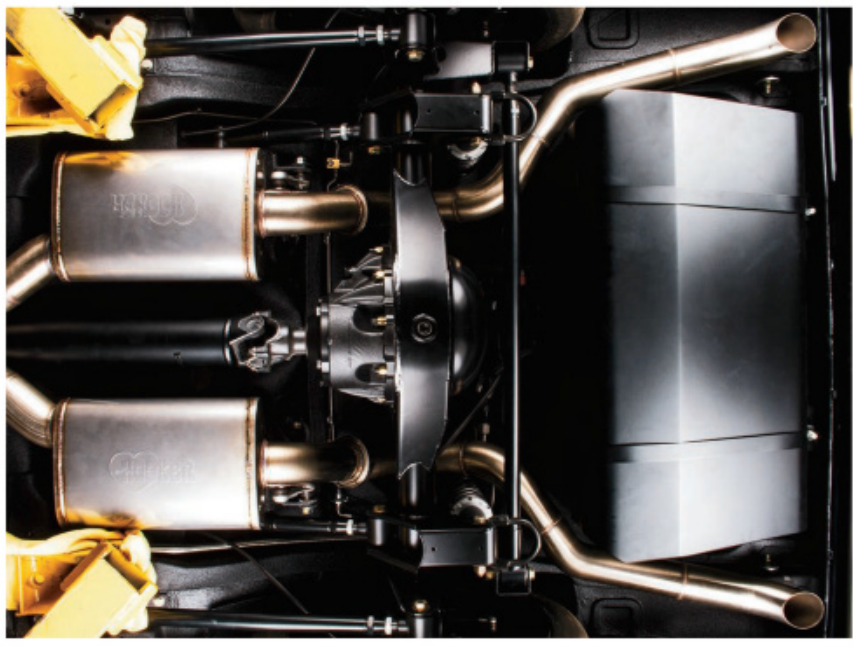


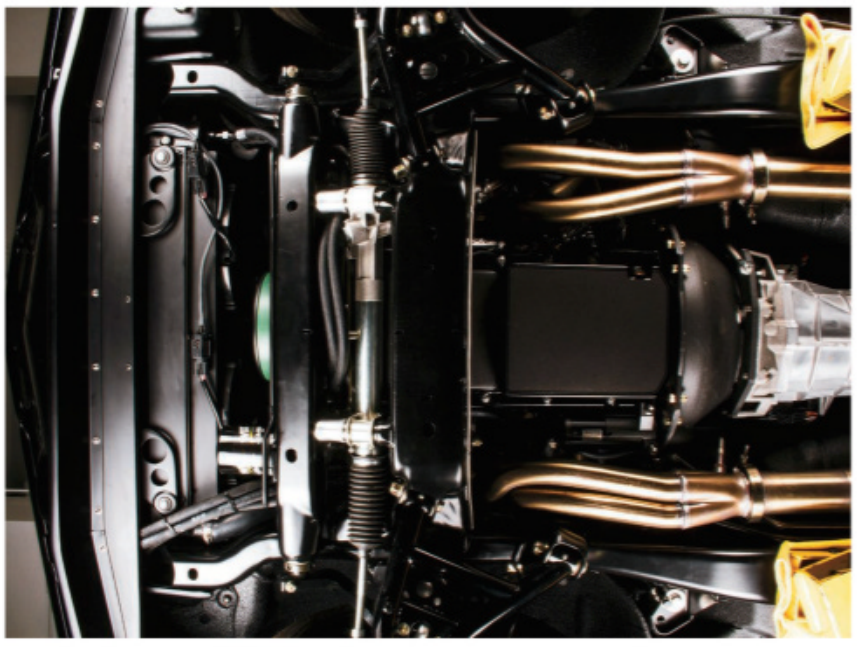
help in the parts department. During the process, Detroit Speed built a custom firewall/transmission tunnel to fit the big T-56 trans. They positioned the engine mounts down a skosh from the original place and slid the block back a bit in order to accommodate the hood understructure and to maintain a stock appearance. Other areas needed a touch, too. The bumpers were changed out for tucked, tinted horns from the Detroit Speed womb.

To streamline the Camaro's airflow management and its cut through the atmosphere, they created a custom spoiler and valance at the leading edge. The dedicated paint and body team for in-house cars at Detroit Speed changed the mood forever with PPG Black. They highlighted that sheen with Billet Specialties hood hinges, Truck-Lite LED headlamps, Marquez taillights, Pilkington glass, and the original door grips.

That place where Tommy lives has aural influence, refrigerated air, and yards of creamy leather and Alcantara under his butt to diminish tension.


Detroit
SPEED, INC.





Native

When it all fits the way it should, the driver and passengers are welcomed as unstressed members of the club. In addition to outfitting the seats, M&M Hot Rod Interiors in Holly Pond, Alabama, set the stage with custom door panels and center console. To frame the scene and help shield the mortals within, M&M Interiors installed a Detroit Speed four-point "rollcage" fitted with a removable harness bar. Schroth harnesses hug supple Recaro Specialist M seats.

Tommy favored a firm foundation for the Camaro and maintained his link with Detroit Speed—adjustability was the goal. Soon, mechanicals dangled from the water-formed subframe;

the Ford axle got the QUADRALink treatment and four-eleven cogs. The Camaro would carry 30-series tires so Tommy and Detroit Speed figured that six-piston calipers on 14-inch plates at each corner would do the job.

That "lots of power" part is a serious step based on a Dart cylinder block that big-block master Pat Musi and Pro Motor Engines turned and twisted in Mooresville, North Carolina. In Musi's universe, the 440 is a virtual peanut but quite capable of frightening power arm-in-arm with ultimate driveability. Even though the tires spun on the rollers, they saw 964 horsepower and 838 lb-ft. With drag radials attached, they think what they're really seeing is about a thousand horseshoes at the wheels. To maintain that, the C&R radiator and charge cooler act with a custom Detroit Speed heat exchanger tank that holds four gallons along with a full bag of ice. A fabricated cold-air box works with a K&N custom round element that has a 6-inch girth and a 14-inch span.

No doubt that Tommy will keep on rollin', but with all the stuff ever-circling his universe, will he ever find the time to poke his street car? On the dragstrip he's bound by rules and protocol and everyone there can see what he's doing. But out on the street, not so much (with a wink and a nod). ***CHP***

TECH CHECK

Owner: Tommy Franklin, Fredericksburg, Virginia
Vehicle: 1969 Camaro

Engine

- **Type:** Dart Machinery LS Next block
- **Displacement:** 440 ci
- **Compression Ratio:** 10.7:1
- **Bore:** 4.185 inches
- **Stroke:** 4.000 inches
- **Cylinder Heads:** Dart LS PRO 1, custom CNC-porting, 62cc combustion chambers, Manley stainless 2.05 intake/Inconel 1.60 exhaust valves
- **Rotating Assembly:** Callies 4340 crankshaft, Manley H-beam connecting rods w/ ARP 2000 bolts, Diamond pistons, Total Seal Hellfire ring packs
- **Valvetrain:** Jesel 1.8:1 shaft rocker system, Manley springs and pushrods
- **Camshaft:** Bullet custom-grind hydraulic roller (specs proprietary)
- **Induction:** Whipple intake manifold and 4.0L supercharger, Holley EFI, custom cold-air box, K&N filter, DS Super 1000 stainless fuel cell, Fore Innovations triple fuel pump module with staged controller and TI Automotive fuel pump
- **Ignition:** Holley Dominator Injector Dynamics 1700 controller, Detroit Speed/Scott primary wires
- **Exhaust:** Detroit Speed custom-built long-tube 1 7/8-inch primaries, 3-inch system, Holley mufflers
- **Ancillaries:** Vintage Air alternator, Edelbrock water pump, custom C&R radiator/aftercooler
- **Machine Work:** Pat Musi/Pro Motor Engines (PME) (Mooresville, NC)
- **Built By:** PME
- **Tuner:** PME
- **Output (at the wheels):** 964 hp, 838 lb-ft

Drivetrain

- **Transmission:** Liberty Gear Magnum T-56 Stage 2, Centerforce DYAD dual-disc clutch assembly, billet flywheel
- **Rear Axle:** DSE 9-inch, limited-slip differential, 4.11:1 gears, 31-spline axles, Dynotech 3.5-inch steel driveshaft

Chassis

- **Front Suspension:** Detroit Speed hydroformed subframe, spindles, rack steering, single-adjustable coilover shocks, antisway bar
- **Rear Suspension:** Detroit Speed QUADRALink, single-adjustable coilover shocks
- **Brakes:** Baer 6S 14-inch discs, six-piston calipers (front/rear), Detroit Speed proportioning valve

Wheels & Tires

- **Wheels:** Forgeline Dropkick 18x10 front, 18x12 rear
- **Tires:** Michelin Pilot Sport 275/30 front, 335/30 rear

Interior

- **Upholstery:** M&M Hot Rod Interiors (Holly Pond, AL)
- **Material:** True Grain leather/Alcantara
- **Seats:** Recaro Specialist M, Schroth safety harnesses
- **Steering:** OE column, Detroit Speed-modified Billet Specialties wheel
- **Shifter:** Bowler
- **Dash:** OE, Detroit Speed custom metal insert
- **Instrumentation:** Custom Detroit Speed/Classic Instruments AutoCross gauges
- **Audio:** Alpine head unit, amps and front speakers; Rockford 10-inch subwoofer, installed by Detroit Speed
- **HVAC:** Vintage Air Gen IV

Exterior

- **Bodywork:** Detroit Speed, custom front valance, Marquez taillights
- **Paint By:** Detroit Speed
- **Paint:** PPG Black
- **Hood:** ZL2
- **Grille:** OE
- **Bumpers:** DSE tucked, front and rear

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SUPER COUPON

U.S. GENERAL BEATS Snap-on

26" x 22" SINGLE BANK ROLLER CABINET

Customer Rating ★★★★★

RED
ITEM 64163
64162 shown

BLUE
ITEM 64434
64433

BLACK
ITEM 64432
64431

9,800 CU. IN.	STORAGE CAPACITY	10,000 CU. IN.
1,000 LBS.	WEIGHT CAPACITY	1,300 LBS.
26-5/8"	WIDTH	26"
22"	DEPTH	20"
40-1/2"	HEIGHT	37"
8	DRAWER COUNT	8
YES	DRAWER DETENTS	YES
YES	PRE-CUT DRAWER LINERS	YES
YES	LOCKING SWIVEL CASTERS	YES
YES	AVAILABLE TOP CHEST	YES
YES	BALL BEARING SLIDES	YES
174 LBS.	WEIGHT	183 LBS.

Snap-on
KRA4008FPBO
* Snap-on KRA4008FPBO stated specs

YOUR CHOICE OF COLOR $239.99

SAVE $1,425

$299.99 PRICE $1,665

66252448

LIMIT 4 - Coupon valid through 6/22/19*

SUPER COUPON

FREE
WITH ANY PURCHASE

3-1/2" SUPER BRIGHT ALUMINUM FLASHLIGHT

- 9 LED
- Compact, Lightweight

COMPARE TO RAYOVAC $3.50
MODEL: BRS9LED-B

ITEM 63599/62522/63875
63884/63886/63888/69111
69052 shown

66251074

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SUPER COUPON

20% OFF
ANY SINGLE ITEM*

66252209

Limit 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressors, floor jacks, safes, saw mills, storage cabinets, chests or carts, trailers, trenchers/backhoes, welders, Admiral, Amen, Baum, Cobra, CoverPro, Daytona, Diamondback, Earthquake, Fischer, Hercules, Icon, Jupiter, Lynxx, Pooles, Predator, Tailgator, Viking, Vulcan, Zurich. Not valid on price purchases. Non-transferable. Original coupon must be presented. Valid through 6/22/19.

PITTSBURGH AUTOMOTIVE #1 SELLING JACKS IN AMERICA

SUPER COUPON

RAPID PUMP® 3 TON STEEL HEAVY DUTY FLOOR JACK

- Lifts from 5" to 18-1/4"
- Weighs 74 lbs.

Customer Rating ★★★★★

NOW $74.99

~~$87.99~~

COMPARE TO POWERBUILT $135.27
MODEL: 647593

SAVE $60

ITEM 64260/64261/64265/64875
69227/62116/62584/68048 shown

66252993

LIMIT 4 - Coupon valid through 6/22/19*

PREDATOR

SUPER COUPON

4000 MAX. STARTING/ 3200 RUNNING WATTS 6.5 HP (212 CC) GAS GENERATOR

- 10 hour run time

Customer Rating ★★★★½

SUPER QUIET

NOW $289.99

~~$339.99~~

Wheel kit sold separately.
ITEM 63080/69729/63079 shown
ITEM 63089/63090, CALIFORNIA ONLY

SAVE $1,609

COMPARE TO HONDA $1,899
MODEL: EB4000

66253443

LIMIT 3 - Coupon valid through 6/22/19*

HARDY

SUPER COUPON

MECHANIC'S GLOVES

Customer Rating ★★★★★

NOW $4.99

~~$5.99~~

COMPARE TO VALEO $11.02
MODEL: 25521

SAVE 54%

ITEM 62434, 62426, 62433, 62432,
62429, 64178, 64179, 62428 shown

66254109

LIMIT 6 - Coupon valid through 6/22/19*

COVERPRO

SUPER COUPON

10 FT. x 20 FT. PORTABLE CAR CANOPY

Customer Rating ★★★★½

NOW $99.99

SAVE $106

COMPARE TO SHELTER LOGIC $205.99
MODEL: 23522

~~$119.99~~

ITEM 63054/62858 shown

66254159

LIMIT 5 - Coupon valid through 6/22/19*

PITTSBURGH AUTOMOTIVE

SUPER COUPON

2 TON CAPACITY FOLDABLE SHOP CRANE

Customer Rating ★★★★★

- Boom extends from 41" to 61-3/4"
- Crane height adjusts from 73-5/8" to 89"

NOW $179.99

~~$229.99~~

COMPARE TO TEQ $239.99
MODEL: 1404PV

SAVE $60

ITEM 60388/69514 shown

66255646

LIMIT 5 - Coupon valid through 6/22/19*

BADLAND

SUPER COUPON

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL

- Weighs 14.3 lbs.
- 11-1/8" L x 4-1/2" H

SAVE $140

Customer Rating ★★★★½

COMPARE TO SUPERWINCH $189.99
MODEL: 1125220

Voted Best Winches

~~$69.99~~

NOW $49.99

ITEM 61840/61297/63476/61258 shown

66256590

LIMIT 4 - Coupon valid through 6/22/19*

CENTRAL PNEUMATIC

SUPER COUPON

3 GALLON, 100 PSI OIL-FREE AIR COMPRESSORS

Customer Rating ★★★★½

A. HOT DOG
ITEM 69269/97080 shown

B. PANCAKE
ITEM 61615/60637
95275 shown

- Air delivery: 0.6 CFM @ 90 PSI 1 CFM @ 40 PSI

YOUR CHOICE $39.99

SAVE 59%

COMPARE TO PORTER-CABLE $98.62
MODEL: PCFP02003

~~$98.99~~

66256646

LIMIT 3 - Coupon valid through 6/22/19*

PITTSBURGH

SUPER COUPON

18 PIECE SAE AND METRIC T-HANDLE BALL END HEX KEY SET

LIFETIME WARRANTY

Customer Rating ★★★★½

NOW $12.99

COMPARE TO HUSKY $32.10
MODEL: HTHKSM14PCN

SAVE 59%

~~$17.99~~

ITEM 63167/63166/96645 shown

66256866

LIMIT 7 - Coupon valid through 6/22/19*

HaulMaster

SUPER COUPON

30" x 18" HARDWOOD DOLLY

- 1000 lb. capacity

NOW $11.99

Customer Rating ★★★★½

~~$15.99~~

COMPARE TO MILWAUKEE $19.97
MODEL: 33700

SAVE 39%

ITEM 92486/39757/60496/62398/61897/38970 shown

66259012

LIMIT 6 - Coupon valid through 6/22/19*

VULCAN

SUPER COUPON

Customer Rating ★★★★½

COMMERCIAL QUALITY HEAVY DUTY WELDING STORAGE CABINET

NOW $259.99

~~$319.99~~

Welders, tools & supplies sold separately.
ITEM 63179

COMPARE TO BLACKSTONE $458.63
MODEL: 80S383

SAVE $198

66260585

LIMIT 5 - Coupon valid through 6/22/19*

PITTSBURGH AUTOMOTIVE

SUPER COUPON

Customer Rating ★★★★½

3 TON HEAVY DUTY STEEL JACK STANDS

- Adjusts from 11-3/4" to 16-3/4"

NOW $18.99

~~$23.99~~

COMPARE TO TORIN BLACK JACK $25.84
MODEL: 1007102

SAVE 26%

ITEM 38846/69597/62392/61196 shown

66263428

LIMIT 6 - Coupon valid through 6/22/19*

ZURICH

SUPER COUPON

OBD2 CODE READER WITH ABS ZR11

Customer Rating ★★★★½

NOW $129.99

NEW

~~$149.99~~

SAVE $20

ITEM 63807

66264437

LIMIT 3 - Coupon valid through 6/22/19*

EARTHQUAKE XT

SUPER COUPON

1/2" COMPOSITE PRO EXTREME TORQUE AIR IMPACT WRENCH

Customer Rating ★★★★½

1190 FT. LBS. TORQUE BOLT BREAKAWAY

- Weighs 4.4 lbs.

NOW $129.99

~~$149.99~~

SAVE $469

COMPARE TO SNAP-ON $599.95
MODEL: PT850

ITEM 62891

66264724

LIMIT 3 - Coupon valid through 6/22/19*

WARRIOR

SUPER COUPON

29 PIECE TITANIUM DRILL BIT SET

Customer Rating ★★★★½

NOW $9.99

~~$17.99~~

COMPARE TO DEWALT $64.99
MODEL: DW1369

SAVE 84%

ITEM 5889/62281/61637 shown

66269173

LIMIT 8 - Coupon valid through 6/22/19*

PITTSBURGH AUTOMOTIVE

SUPER COUPON

VEHICLE POSITIONING DOLLY

- 1250 lb. capacity

Customer Rating ★★★★½

COMPARE TO GOJAK $190.75
MODEL: GOJGS211

SAVE $125

~~$89.99~~

NOW $64.99

ITEM 62234/61917 shown

66269561

LIMIT 4 - Coupon valid through 6/22/19*

HaulMaster

SUPER COUPON

18" WORKING PLATFORM STEP STOOL

Customer Rating ★★★★★

- 350 lb. capacity

NOW $19.99

COMPARE TO GPL $51.45
MODEL: H-21

SAVE 61%

~~$29.99~~

ITEM 62515/66911 shown

66272336

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*Original coupon only. No use on prior purchases after 30 days from original purchase or without original receipt. Valid through 6/22/19.

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GET (BODY) FIT!

If you haven't gotten the hood, door, fender, and decklid gaps right, you're not show ready

TEXT & PHOTOS: **Jim Smart**

You can have the perfect paintjob, yet still have a ride that falls short. When you've seen as many Chevys as we have through the years you develop a keen eye for detail. You spot the flaws right away: sloppy gaps, uneven panels, and other irregularities.

Our pet peeve with show cars and weekend "under-the-streetlights" cruisers is sloppy body fitment—fenders, hoods, doors, and decklids that do not fit properly. Gaps outrageously wide and sloppy, panels not flush, doors that do not shut properly, a decklid you have to slam close, and a host of other issues make an otherwise nice car uncomfortable to the eye.

Pro Touring also needs to mean pro fit. It is time to think more like a good old-fashioned hot rodder and treat your Chevy to the process known as mock-up, or pre-assembly. A mock-up session is all about taking your Chevy's body panels and doing a fitment check before body prep and paint begin. The goal should be to achieve perfect door, fender, hood, and decklid gaps and overall fitment (adjacent panels aligned and flush) before you do anything else.

GETTING IT RIGHT

The best time to adjust the fenders, hood, doors, and decklid is during paint prep prior to laying on the color.

This is the time when you have the freedom to get all of your Chevy's body panels correctly positioned and gapped without fear of scratching or nicking fresh paint. If you've already had the car painted all is not lost. You just have to be very careful when adjusting and locking down the panels. Then, do any touch-up work once the body panels have been properly fitted. The key is to not damage the paint.

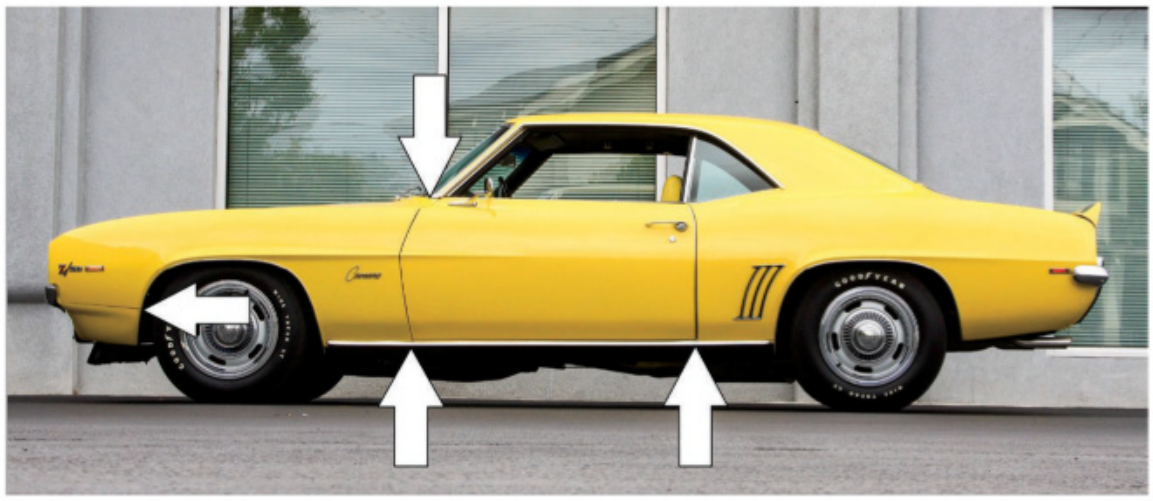
Body panel adjustment is best accomplished and easiest when the body is in primer to observe gaps and panel cohesiveness. If you're still in old paint, the gaps—depending on the color—are more challenging to see. Light gray primer is the best color in which to set gaps and adjust panels because you can see these dimensions clearly.

Setting gaps and leveling panels isn't easy for even the most seasoned body guy, and it depends largely on your eyesight and judgment. You must have a good eye for gaps and straightness. If you're working with a body that has never been wrecked or ever been apart the chances are good the body dimensions are on the money. However, we've seen many low-mileage, unmolested originals with sloppy gaps and panels. Remember, all kinds of people assembled these cars back in the day and a good many of these classic Chevys rolled off the line with notable quality issues.

All body panels have a fitment range in which you can make adjustments, hence slotted bolt holes and the use of shims. The factory used shims to get the fenders level with the hood and flush with the doors. Hood hinges are slotted to get it centered between the fenders. Door hinges are fully adjustable at the body and at the door. Decklids are adjustable at the lid and at the body for full adjustability. If you cannot achieve proper adjustment, something is likely wrong with the body itself.

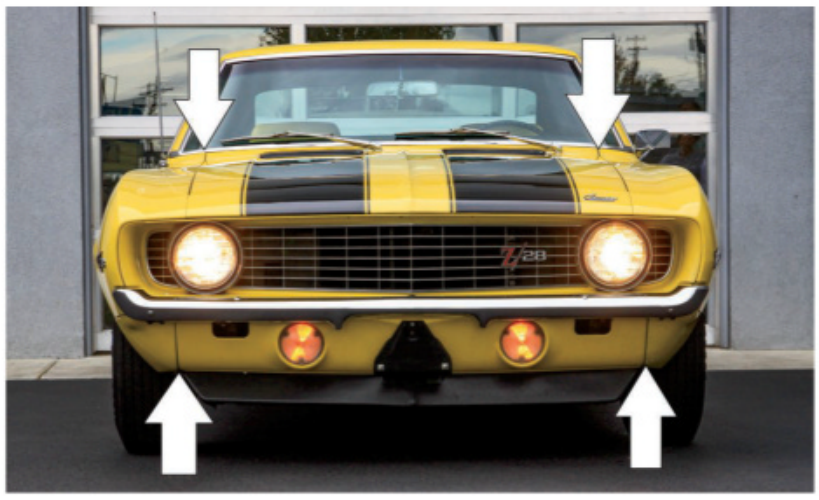
In order to get the doors properly aligned and locked in, you must first have solid hinge bushings and pins. Bushings and pins that are worn out will not hold an adjustment. The gap will continue to degrade more and more as hinge bushings and pins wear out of adjustment. The best advice is to rebuild the factory hinges, which can be accomplished in your garage. Pins and bushings are available from many retailers such as Classic Industries. New old stock GM pins and bushings are also out there in the online classifieds.

Get (Body) Fit!



01 | Here's a factory original 1969 Camaro Z/28. These are the gaps you want focus on. Door and fender gaps are the first thing you see when approaching a car. The most important gaps are those on top that you first see opening doors. The door should sit flush with the quarter-panel with a perfect 1/8- to 3/16-inch gap. GM allows for up to a 1/4-inch, which, in our opinion, is too wide.

02 | Head on, the valance-to-fender gaps should be flush as shown here. The hood-to-fender gaps should be uniform from the cowl to the fascia at 1/8- to 3/16-inch. As long as you have a straight body (good bones), factory sheetmetal gaps should be easy to adjust.



03 | The decklid should sport uniform gaps for 360 degrees if the quarter-panels and tailpanel are true. If ever you have to replace quarter-panels or the tailpanel do so with the decklid installed and properly adjusted beforehand so you have a solid reference point to work from.

04 | This is called the priority gap because it is the gap we see most when entering and exiting the car. Because we're working with mass production vehicles, it is virtually impossible to get a perfect gap because stampings can vary, sometimes by a lot. You may need to grind, fill, and/or finesse the edges to get the gap you want.

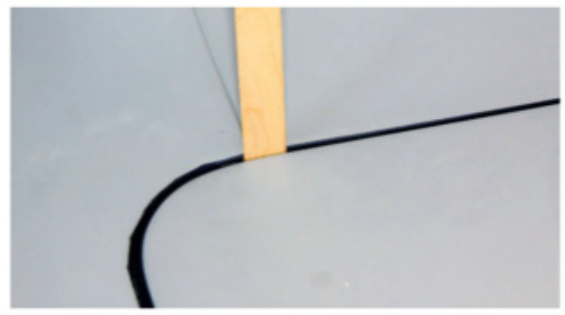
05 | Readers often ask us what is the best way to measure a gap. Our easy answer is to use a standard paint stirring stick, which is a good unit of measurement of around 1/8- to 3/16-inch.

Once you have established that the door hinge bushings and pins are of solid integrity, examine the door latches and strikers to ensure they mate smoothly. You should be able to gently nudge the door closed and have it catch. If you have to slam the door, an adjustment is required. The decklid should latch and seat with a nudge. Hoods have always needed a touch more force to get past the safety catch and into the latch.

Another door adjustment issue is door weight. An empty door weighs less than a door loaded with window glass, the regulator mechanism, and the latch assembly. All of these affect how the door hangs. The doors should be hung with all of these components installed in order to get the gaps where they will be with the car fully assembled. Another important issue is to have the car sitting level on all four tires with the suspension at rest. Unit body cars, like the Camaro and Nova, flex when they're on jack stands or are being supported by a floor jack. You would be amazed at how much flex there is as you drive down the road or when you're tackling a canyon pass.

Before you handle the task of body panel adjustment, overall body dimensions need to be checked. How true is the body you're about to assemble? Has it ever been wrecked and if so was the repair up to par dimensionally? Was the body treated to a frame table where it could be pulled back to factory specifications? These dimensions, which are in any Chevrolet service manual, can be checked before you start adjusting panels.

And finally, all body panel adjustments should begin where the door meets the B-pillar and quarter-panel. If you have the door gap at the B-pillar spot on, the rest should fall in line. Hang and adjust the doors first, then, the front fenders and then the hood. The decklid can be gapped anytime since it's surrounded by fixed panels. ***CHP***



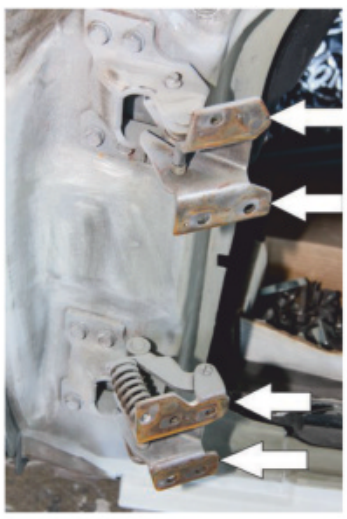
06 | Decklid gaps, like door gaps, should be the thickness of a paint stick: 1/8- to 3/16-inch. You will find stamping irregularities can cause these numbers to vary to where you get a wavy gap at the quarters. The optimal width is a consistent 1/8-inch gap all around.

07 | If you study the gap around this decklid it tends to wander as it nears the tailpanel. The gap is at the correct 1/8-inch at the top near the deck filler panel but considerably wider at the trailing edge near the tailpanel. Adjustments should be made where the gap at the top is wider, with the side gaps at 1/8-inch. This requires a lot of patience.

08 | The gaps here at the cowl and A-pillar are especially tricky to set. Because this is a complex angle, you have to stay with it until all the angles match along with door gaps the rest of the way. GM specs call for it be around 1/16- to 1/8-inch.

09 | Note how the trailing edge door gap is wider at the top than at the bottom. This is not acceptable. The angle of the door must be adjusted to where this gap is 1/8-inch from top to bottom. The door skin must also be flush with the quarter-panel skin and the front fender.

10 | Door adjustment happens where the hinge meets the door and where the hinge meets the A-pillar. You should never have to remove the hinges from the body, and they should remain where the factory installed them to begin with. Then, you can keep door angle adjustment where the hinge meets the door.



11 | A floor jack is used here to raise and lower the door as adjustments are being made. Ideally, you will position the jack mid-door to get it centered then make finite adjustments. Snug the bolts to where you can finesse the door yet maintain position then tighten the bolts.

12 | The doors are the toughest body components to adjust. Note this door is completely assembled and at the proper weight for installation and adjustment. If you install the door empty it's not going to maintain its adjustment when it is assembled. It will droop as components are installed.

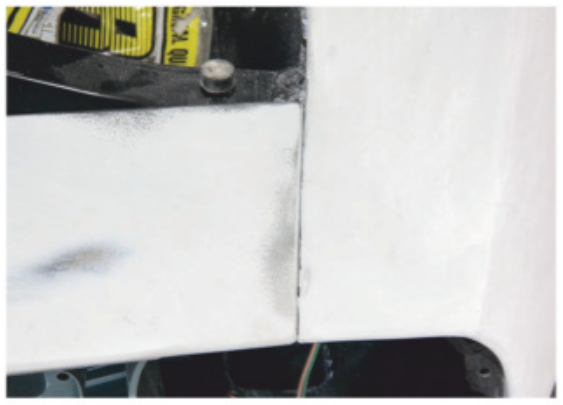
13 | Here's a cool trick we learned from AR Auto Body in Lancaster, California. Before the car was disassembled, small 1/8-inch pilot holes were drilled through the hinges into the door and A-pillar to lock in the factory adjustment. This awl is being used as a jig pin to get the hinges back to where they were prior to disassembly.

14 | With the awl stuck through the pilot hole, the hinge bolts are tightened, locking in the adjustment. The door should sit perfect.

15 | The next daunting task is front fender adjustment, which begins at the door leading edge. Because fenders can be long, a lot of adjustment is required, especially on Camaros. There's also the wheelhouse to contend with, which should be connected and adjusted last.

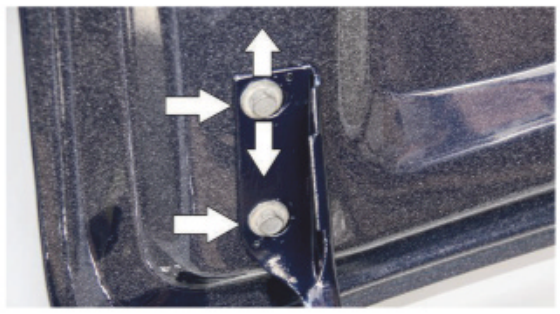
16 | These two attachment points at the firewall and cowl may or may not require shims to get the adjustment where it needs to be.

17 | Where the door meets the fender can be a huge point of frustration, especially if you're working with reproduction sheetmetal. Snug the fender bolts to prevent accidental movement, but do not tighten until all the adjustments are complete.



18 | Where the fender meets the header panel on this Camaro there is no gap. The fender and header panel above the grille are bolted together flush.

19 | The decklid gap at the tailpanel should look like this where the decklid and tailpanel are dead on straight from quarter-panel to quarter-panel. This gap should be 1/8- to 3/16-inch.



20 | These fender bolts at the decklid and hinge allow movement in all directions. Lower the lid and check gaps with these bolts snug, yet loose. If the gaps check out, tighten the bolts and check the gaps again. These bolts should be body color, which means adjustment takes place before the body is painted.

21 | These are adjustment shims used to get the fenders aligned. You should never use them on door hinges or at the hood and decklid.

ORANGE EVOLUTION

RIDES The brainchild of an electrical engineer and an airline pilot

Since the beginning of automotive history, the science behind cars was derived from outside sources. For example, many of the drivetrain components stemmed from aerospace technologies, and everything from forced-induction systems to wind tunnel testing helped shape our low-altitude flying road machines. Though aviation has always been a big influence, there are several other sciences like those that formed the electrical functions of a car. So it comes as no surprise that an electronics wizard and an airline pilot would be able to combine resources to create this advanced, custom 1966 Chevelle.

TEXT & PHOTOS: **Fuelish Media**

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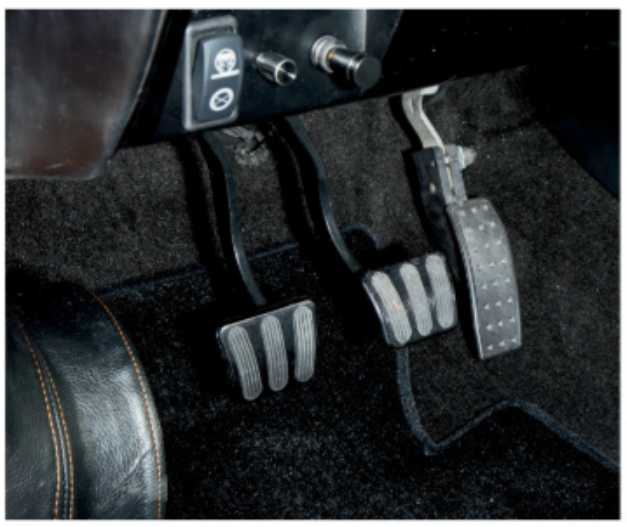
Orange Revolution



Though Jeremy "Jerems" McLellan was able to create this wicked muscle car, it is actually his first vehicle of this type. You see, when he was a kid he—like most of us—had posters on his walls of exotic cars and would lie in bed dreaming about owning a vicious car that could rip on the streets. Though he admired stylish and fast cars, he grew up in a family that didn't share the same appreciation for them. As embarrassing as it may sound, Jeremy's first car was a Chevy Cavalier. It wasn't something to brag about but it got him from point A to point B in a decent manner.

Jeremy curbed his appetite for horsepower by concentrating on his education in high school. From there, he went on to college and continued to suppress his urge to splurge on a better ride, as he wanted to make it out debt free. The plan panned out so far as he was able to score a nice gig keeping the electrical systems on oil rigs in working condition. For a while he lived overseas, and building his dream car was not really an option. In the meantime, he did his research and came across the MuscleCar Place podcast by Robert Kibbe. Though Jeremy wanted to build a 1966-'67 Chevelle, he was intrigued to hear that Jeff Allison of Allison Customs built a '64 Chevelle for Robert. This was like having a seal of approval, so he called Jeff and the rest is history.

The next thing on the list was to actually find a car to start with, and as usual it started online. They found this ’66, which seemed to be in good shape and was already primered; looking like it was ready for paint. It was purchased sight unseen, and in our experience these types of deals can go either way. Unfortunately, after Jeff had the car sodablasted, he found out that the primer was hiding some major rust and compromised panels. It was so bad that Jeff considered a whole new car, but he ended up sticking with it and replacing most of the bolt-on parts, including the front clip. The only major parts he was able to salvage were the roof, passenger door, and some of the A-pillars.

Once the body was reshaped, it was on to updating the Chevelle with modern features. The frame was swapped out for an Art Morrison Enterprises frame equipped with RideTech ShockWave airbags to lift the car up to clear speed bumps. The chassis utilizes a modern front suspension with C6 spindles, sway bar, and Detroit Speed rack-and-pinion steering. The four-link houses a Strange 9-inch rearend with a full floater kit for better durability. Lastly, a set of 14-inch brakes were attached on all four corners along with a set of Boze Clutch Concave wheels with Michelin rubber.

Next on the list was the powerplant, and Jeremy wanted something that

really had some kick to it. He chose to go with a modern 650hp/lb-ft supercharged LT4. This was a few years ago when components to make them fit in an application like this didn't exist. One of the problems was that the accessory drives on these Gen V small-blocks don't have a power steering pump. Drive Junky was able to work with Jeremy and made a system that would not only fix the problem but improve its styling. Then, the LT4 was backed by a TREMEC T-56 Magnum manual trans with reverse lockout, all from American Powertrain.

For the rest of the car, it had to be modified to make it unique. For starters, the driprails were recessed in order to retain some of the original shape, but in a cleaned-up version. The doors were also cleaned up—but not shaved—as mechanical door handles are very reliable. Kindig-it handles were used to get a stealthy look without having the risk of being locked out if the battery ever dies.

On the lower sides of the rear body, air ducts were put place to cool the brakes. These were influenced by Jeff's passion for aviation, and the shape is similar to what you would find on an aircraft. Underneath, the front inner fenders and new rear mini-tubs were expanded to fit the 9-inch-wide front and 12-inch-wide rear wheels. The exhaust was run through to the rear sides of the body so the trunk had to be modified with false floors to fit the tubes. To get the color Jeremy envisioned, he called House of Kolor direct and was referred to master paint mixer Jim Hetz. With several spray-outs and debate, Jeremy realized the first batch of the custom-mixed Tangerine Kandy was the right combination of color and depth. Then it was painted and balanced with just enough pieces powdercoated matte black to give off just the right amount of accents.

Modern was the theme on this classic muscle car that included details on the interior. First, a new center console was added as well as electric seats from a 2006 GTO. Then, Generations of Design was able to reupholster the entire inside in black leather with orange stitching. Afterward, it was upgraded with Speedhut Revolution gauges, electric windows, Vintage Air A/C, new audio components, and a four-camera system that can be viewed with the Pioneer 7-inch touchscreen head unit. Since Jeremy is an electronics guru, he wired it all with a Ron Francis harness kit.

As the car approached completion, Jeff found a spot for it at the 2018 SEMA Show. Even though the build had gone on for a few years, the SEMA deadline is always a harsh one to face. The crew got it done and it was an absolute hit.

It was a long wait, but Jeff was able to make Jeremy's dream car a reality—one we absolutely dig. ***CHP***

TECH CHECK

Owner: Jeremy "Jerems" McLellan, London, Ontario, Canada
Vehicle: 1966 Chevelle

Engine

- **Type:** 2016 Chevrolet Performance LT4
- **Displacement:** 376 ci
- **Compression Ratio:** 10:1
- **Bore:** 4.065 inches
- **Stroke:** 3.622 inches
- **Cylinder Heads:** A356 T6 Rotocast aluminum
- **Rotating Assembly:** Forged steel
- **Camshaft:** Hydraulic roller
- **Induction:** 1.7L Eaton R1740 TVS supercharger, custom cold-air intake
- **Ignition:** Stock
- **Engine Management:** LT4 crate engine ECU
- **Cooling:** C&R Racing radiator and intercooler, SPAL electric fans
- **Exhaust:** Side-exiting custom 3-inch, Black Widow Venom 250-series mufflers
- **Ancillaries:** Powdercoated valve covers, ceramic-coated headers and heat shields, painted lettering on supercharger, Canton Accusump, Drive Junky Street Monster accessory drive, Powermaster AD244 220-amp alternator, Ron Francis wiring harness
- **Fuel System:** Rick's Tank tank, Camaro ZL1 pump, LT4 sending unit
- **Built By:** Pace Performance, Allison Customs
- **Tuned By:** Chevrolet Performance, Pace Performance

Drivetrain

- **Transmission:** TREMEC T-56 Magnum assembled by American Powertrain, Bowler Transmission reverse lockout, twin-disc clutch, billet flywheel
- **Rear Axle:** Strange 9-inch with floater kit, 35-spline axles

Chassis

- **Frame:** Art Morrison Enterprises modified to fit 275 front tires
- **Front Suspension:** Art Morrison IFS with C6 spindles, sway bar
- **Rear Suspension:** Art Morrison four-link
- **Springs/Shocks:** RideTech ShockWaves, AccuAir e-Level management
- **Steering:** Detroit Speed rack-and-pinion
- **Brakes:** Wilwood 14-inch rotors, six-piston calipers front; 14-inch rotors, four-piston calipers rear; Wilwood tandem master cylinder; hydroboost

Wheels & Tires

- **Wheels:** Boze Clutch Concave 19x9 front, 20x12 rear
- **Tires:** Michelin Pilot Super Sport 275/35 front, 335/35 rear

Interior

- **Seats:** 2006 Pontiac GTO electric seats, Morris Classics seatbelts
- **Upholstery:** Black leather with orange stitching by Generations of Design, plush black carpet
- **Instrumentation:** Speedhut Revolution gauges in modified dash
- **Steering:** ididit tilt column, MOMO Racing wheel
- **Shifter:** Brian Finch billet 8-inch shifter handle
- **Stereo:** Pioneer 7-inch touchscreen head unit, JL Audio speakers and amps, DC Audio subwoofer
- **HVAC:** Vintage Air, Dakota Digital controller
- **Miscellaneous:** Custom door panels and armrests, custom center console, four-camera system, Lizard Skin insulation

Exterior

- **Paint:** House of Kolor Tangerine Kandy custom mix by Jim Hetz of Hetz Studio, body painted by Coates Collision Center, black powdercoating by New Image Powder Coatings
- **Hood:** SS replica
- **Grille:** Reproduction
- **Bumpers:** Reworked and tucked
- **Modifications:** Reproduction front clip, recessed driprails, Vision Hotrods mirrors, Kindig-it door handles, NACA rear brake ducts, tubular core support, Eddie Motorsports hood hinges

10 Champions of DragWeek 2017 all run Gear Vendors

Dave Schroeder and John Enz Unlimited and Overall 66 Corvette

Matt Blasco ProStreet PA 72 Dart

James McEntire ProStreet NA 68 Camaro

Brad Dyer Modified NA 72 Nova

Nathan Chesler SS BigBlock PA 93 Mustang

Mark Gissendaner Gasser B Gas 40 Chev Coupe

Curt Johnson SS Big Block NA 93 Mustang

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Jarrad Scott Gasser A Gas 62 Ranchero

Tom Ciancitto Hot Rod Class 37 Ford F1 Pickup

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MOROSO GM LS & LT ULTRA 40 IGNITION WIRE SETS	PART BLUE WIRE	PART RED WIRE	PART BLACK WIRE	SPARK PLUG WIRE LENGTHS CYLINDER #								PLUG BOOT	SLEEVED OR UNSLEEVED
				1	2	3	4	5	6	7	8		
GM LS COIL-ON PLUG	73535	N/A	73823	8	8	8	8	8	8	8	8	STRAIGHT	SLEEVED
GM LS COIL-ON PLUG, COILS ON VALVE COVERS	N/A	N/A	73846	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	90º	SLEEVED
GM LS / LT COIL-ON PLUG	73537	N/A	73827	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	STRAIGHT	SLEEVED
GM LS COIL-ON PLUG	73536	N/A	73826	12	12	12	12	12	12	12	12	STRAIGHT	SLEEVED
GM LT COIL-ON PLUG	N/A	N/A	73731	13	13	13	13	13	13	13	13	135º	SLEEVED
GM LS COIL-ON PLUG, REMOTE COILS	N/A	N/A	73845	15	15	15	15	15	15	15	15	90º	SLEEVED
GM LS COIL-ON PLUG	73660	73680	73703	8	8	8	8	8	8	8	8	STRAIGHT	UNSLEEVED
GM LS / LT COIL-ON PLUG	73662	73682	73705	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	STRAIGHT	UNSLEEVED
GM LS COIL-ON PLUG	N/A	N/A	73272	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	135º	UNSLEEVED
GM LS COIL-ON PLUG	73659	73679	73730	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	SHIELDED	UNSLEEVED
GM LS COIL-ON PLUG	73661	73681	73704	12	12	12	12	12	12	12	12	STRAIGHT	UNSLEEVED
GM LS / LT UNIVERSAL	73811	73837	73828	48	48	48	48	48	48	48	48	STRAIGHT	UNSLEEVED

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PARTS BIN

by **Nick Licata**

EFI Dual Plenum Intake

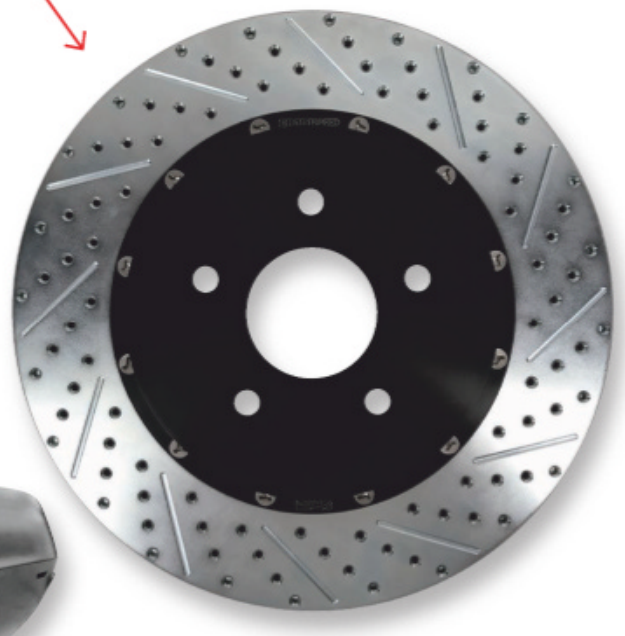
Holley/MSD is pleased to announce the release of Sniper EFI Dual Plenum intake manifolds. Developed specifically for LS engines and available for both cathedral port and rectangular port cylinder heads, they feature dual plenums and dual throttle bodies in an innovative design. One tapered plenum accommodates one entire bank of cylinders; the other plenum feeds the other bank. This means the entire volume of incoming air in each plenum is distributed to just four cylinders, with the tapered shape increasing the air velocity directed to each intake runner for increased airflow and even dispersion to all intake ports. Learn more at **holley.com** or call **866.464.6553**.

Brace for Performance

The Detroit Speed, Inc., 2016-and-newer Camaro Rear Coilover Tower Brace kit is a bolt-in design that increases overall vehicle stiffness. It is made of lightweight aluminum with a black-anodized finish that includes the brace and installation hardware. Detroit Speed recommends using this kit when upgrading to a coilover suspension. There is more information at **detroitspeed.com** or you can call them directly at **704.662.3272**.

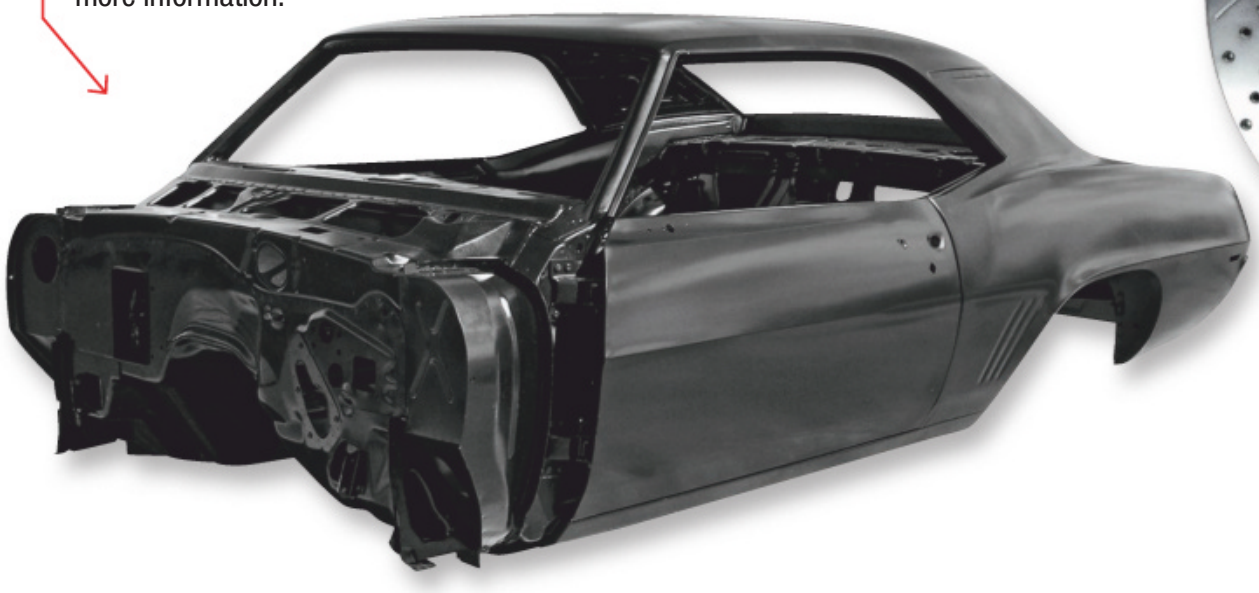
C6 Brake Upgrade

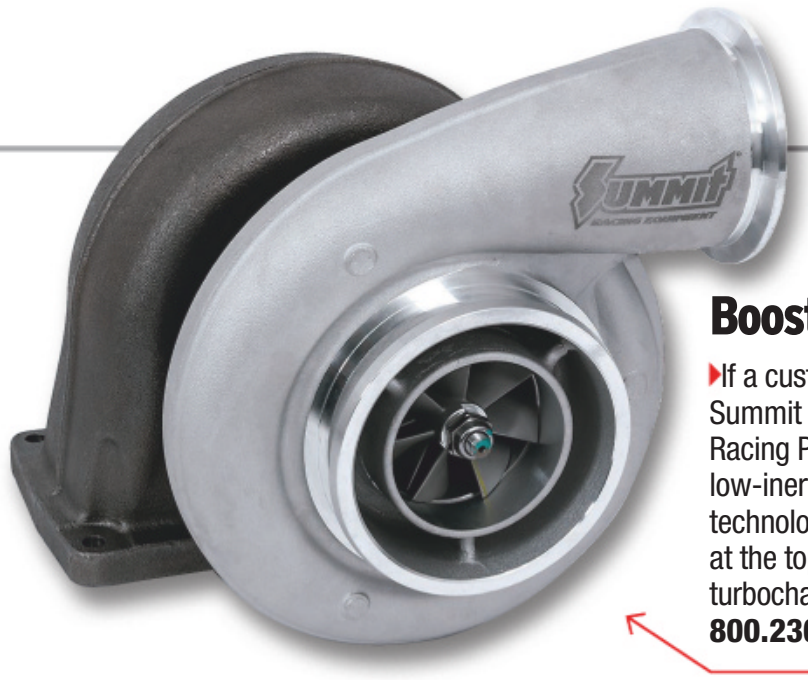
Baer's new EradiSpeed line of products has expanded to include the popular 2005-'13 Corvette Z06. The EradiSpeed castings are direct bolt-on OE replacements, making for a simple installation upgrade. The rotors are unique, purpose-built castings designed with a directional vane structure and feature a 6061-T6 machined aluminum hat that bolts to the rotor with high-grade NAS stainless hardware. The EradiSpeed rotor is finished in Baer's legendary slotted, cross-drilled, and zinc-plated surface finish, creating a work of art behind the wheel. For additional information visit **baer.com** or call **602.233.1411**.



New Steel Camaro Shell

Start your 1967-'69 Camaro restoration on the best foundation: a new Real Deal Steel body shell available at National Parts Depot. These body shells are constructed with 18-gauge steel parts, feature 25 percent more spot welds than GM originally used, and are more structurally sound than the originals. Each body shell includes the dash, roof skin, driprails, headliner bows, quarter-panels, rear deck filler panel, taillight panel, and rear framerails installed, plus hinged and fitted door shells and trunk lid. Deep wheeltubs are available for an additional charge. Call **800.874.7595** or go to **npdlink.com** for more information.





Boost Your Performance

If a custom turbo system is in the plans for your street hero, race car, or diesel puller, Summit Racing has affordable turbocharger head units you should consider. The Summit Racing Performance Turbocharger design promotes greater airflow by using a low mass/low-inertia wheel that performs like a wheel of greater size and mass. The extended tip technology allows faster spool-up at lower engine speeds while providing plenty of boost at the top end—up to 70 psi, depending on the turbo and application. Check out these turbochargers, which also come polished, at **summitracing.com** or call them direct at **800.230.3030**.

Gauge Personalization

Dakota Digital is proud to unveil the Universal HDX series of instrumentation. The HDX series is the latest in aftermarket automotive instrumentation technology. HDX takes personalization and usability to a whole new dimension as this system allows the user to select their favorite illumination color for the gauge readings and needles, as well as the TFT message center displays. Calibration and personal settings can be manipulated with the built-in, capacitive-touch buttons or the available Bluetooth app for iOS and Android devices. More information can be obtained by calling **800.852.3228** or by visiting **dakotadigital.com/hdx**.

Get a Grip

Classic Industries is proud to introduce a new reproduction steering wheel for 1982-'89 Camaros. This steering wheel was original on 1982-'86 models with the NK3 or NP5 leather interior option—typically the Z28 and IROC-Z models. Each steering wheel is produced to factory specifications with a stamped steel center ring and leather grip, including replicated correct stitching for an authentic appearance. Accurate, matching leather-wrapped horn button cap and horn contact wire are also available separately. Click on over to **classicindustries.com** or call them at **800.854.1280**.

Frame-Mount Booster

Classic Performance Products' custom frame-mount booster kits for Tri-Five Chevys bolt to the frame and are ideal when smoothing your firewall for a custom engine bay look. CPP's complete kits include the 7-inch dual-diaphragm booster, master cylinder, pedal, and mounting hardware. Disc/drum and disc/disc kits also include the proportioning valve and bracket assembly. These high-quality kits are made in the USA. Go to **classicperform.com** or call **800.830.7657** for more information.

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JUST SAYIN

By: **Chris Holstrom**

My Chevy bucket list

✶I'm staring down a slippery slope to that magical half-century mark. Just a mere 10 months from now I will be 50. I don't feel that old. As a matter of fact, I'm in the best shape of my life. I feel like I'm maybe 30ish ... until I look in the mirror and see some old man staring back. All of a sudden I'm sucker-punched back to the reality that the hands of time are slipping by much faster than I want to admit. Here's the rub ... at any given time there are about 30-40 cars bouncing around in my head that I would love to build before my time on this earth expires. Consider it a bucket list of sorts. Most of them are Chevys, a few are obscure—most are not. Not all are high-dollar. Here are a few examples trapped in my head. Hopefully, someday, a few will transform into reality.

1974 MALIBU

Oh boy, I can see now. It's got to have the big opera-type windows. I would pull in the bumpers a bit. Clean up the ill-fitting panels. Paint it a sinister dark color with deep tinted windows. It would have to sit low with 19-inch Rushforth Black Widow wheels with brushed hoops and exterior trim. I would throw some good suspension and Baer brakes at it. Finish it off with an ultra-quiet twin-turbo LS. Think 7 Series BMW road car that would embarrass most late-model throttle jockeys.

DRAG WEEK CAR

The model doesn't really matter, but I would prefer something more obscure like an '80's Malibu wagon or some other survivor type car. I'm not sure which class to race in, just one I could get out and enjoy the Drag Week experience just to say I've done it. It would be a small-tire car and I would study the rules and exploit every loophole possible. Isn't that what racing is all about?

2010 CAMARO

Quickly approaching the 10-year mark since production began, they are getting very affordable. Simple, refined, elegant ... not my version. I would buy a well-used model (think rental car thrashed). First thing I would do is put it on a serious diet and shed any and everything unnecessary to function. I would 'cage it and make it loud and fast ... very fast. I could drag race it, autocross it, whatever, but mostly just tick people off at the local drive-through coffee stands trying to place their order over the loud rumble of some overcammed, ProCharger supercharged LS powerplant. It wouldn't do any one activity well, except boiling tires off at will. It wouldn't be comfortable to drive.

Photo by Robert McGaffin

The paint wouldn't be perfect. But it would be the one car I would take on errands and not stress it if there were a shopping cart resting against the fender.

1962 BUBBLETOP BEL AIR

This is arguably the sexiest car Chevrolet ever produced. One of the last true classics before plastics invaded the production process. I know that is a bold statement and in stock form they do leave a little on the table. "Wheels and stance make the car," is my mantra and these cars absolutely transform with an altitude adjustment and correct wheels. My build would be simple, keeping with the mostly stock appearance. I would hide a bunch of details that would easily be overlooked. I love the bold pattern and colors the interiors from this era had. A bench seat and three pedals would be mandatory. Power would come from a stroked 409 with fuel injection. The engine would look like 1962 with all modern electronics hidden away. This one would simply fall under the less is more category.

1955 CHEVY

This is the one I will own and start on by the time this goes to press. 1955 Chevys are my roots. I bought one as my first car when I was 13. It's time to get back to that car as a tribute to turning 50. The plan and design are consuming my thoughts and keeping me up at night. How do you build a '55 a certain way that hasn't been done before? I've got almost every detail worked out. I don't want to give away too much, but I can say there is

Photo by Tommy Lee Byrd

a certain black '55 Chevy that graced the silver screen years ago that many a young man fell in love with. The plan is simple. What if Mr. Falfa still owned that car and it kept getting updated throughout the years. What if he redid that car today but kept some of the key features that make it so iconic. What if?

Other cars worth mentioning are: a 1970 Chevelle without stripes and a nasty large-cube big-block, a 1979 Z28 with perfect gaps and stance, a 1970's shorty van (yes, I want one ... bad), a clean C10, the usual mid '60's Corvette, and many more.

Time to get busy.

What's on your Chevy bucket list?

Just sayin'

Chris Holstrom is the owner of Chris Holstrom Concepts, a hot rod shop in Puyallup, Washington, that specializes in repairing and building high-quality muscle cars and hot rods.

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